

STUDIES ON THE CLASSIFICATION OF THE CATFISHES OF THE ORIENTAL AND PALAEARCTIC FAMILY SILURIDAE.

By JANET HAIG,

Natural History Museum, Stanford University, U. S. A.

CONTENTS.

	PAGE.
Introduction	59
Acknowledgements	60
The Family Siluridae—	
A. History of the Family	60
B. Characterization of the Family	60
C. Distribution	61
D. Diagnostic Key to the Genera	61
A Tentative Review of the Genera of Siluridae—	
1. <i>Hemisilurus</i>	63
2. <i>Ceratoglanis</i>	65
3. <i>Belodontichthys</i>	65
4. <i>Silurichthys</i>	67
5. <i>Silurus</i>	71
6. <i>Wallago</i>	79
7. <i>Hito</i>	81
8. <i>Ompok</i>	83
9. <i>Kryptopterus</i>	92
A Checklist of the Genera and species	94
References	110

INTRODUCTION.

The present study was undertaken in order to untangle some of the problems of classification which have beset this group. The genera have not been studied *in toto* since the days of Bleeker and Günther. In this study I have made an attempt to clarify the relationships of the various genera, which in some cases has involved revision of generic limits.

Lack of time and material has precluded a thorough analysis of the species within any genus ; for the same reason no skeletal examinations were possible. It is hoped, however, that a clarification of generic limits through study of external characters will make it easier in the future for interested workers, with sufficient material at hand, to do further and much-needed work on both the genera and the species.

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THE FAMILY SILURIDÆ.

A.—*History of the Family.*

The catfishes as a whole (Nematognathi or Siluroidea) have been recognized as a natural group since early times. For many years all of them, with the exception of the armoured forms, were carried in the family Siluridae, named for the type genus *Silurus*.

These catfishes were variously sub-divided by Bleeker, Günther, and others, with the Siluridae (*sensu stricto*) generally recognized as a more or less homogeneous group, chiefly on the basis of external characters such as fins, barbels, and teeth. These systems of classification included some genera that are now placed in other families.

Regan (1911) was the first to separate the Old World catfish groups on the basis of thorough osteological study, although Eigenmann and Eigenmann (1890) had already done this for the South American forms. Regan gave family rank to the groups which most authors had previously called subfamilies. The name Siluridae was restricted by him to the natural group which includes *Silurus*, the type genus, and its close relatives.

The most important regional treatments of the family as a whole (none of them covering all known genera) are those of Bleeker (1858 and 1862a), Day (1878-88), Weber and Beaufort (1913), and Smith (1945). In addition, Günther (1864) reviewed all the genera known at that time, but his system has since undergone considerable revision.

B.—*Characterization of the Family.*

The Siluridae may be readily distinguished from other Old World catfishes by the following characters. The body is naked, elongate, and compressed. The head is depressed except in one genus, and covered with skin. There are 9 to 20 branchiostegal rays. The gill membranes are more or less overlapping, free from each other and from the isthmus. One pair of maxillary barbels is present, and usually one or two pairs of mandibular barbels. There are depressible teeth in both jaws and on the vomer, and often on the palatines in one genus. The dorsal fin is very short, spineless, with 1 to 7 rays, or may be entirely lacking; its

position is characteristically anterior, usually over the ventrals. The ventral fins have 6 to 14 rays. The pectorals have a spine, articulated for about half its length, and 8 to 22 rays. The anal is very long, extending from just posterior to the anal opening to the caudal or confluent with it, and is of about 48 to 110 rays. There is no adipose fin. The lateral line is straight, extending from just behind the operculum to the caudal base, and has short ventral branches, dendritic or not, but no dorsal branches. The anterior pair of nostrils is tubular; the posterior pair is valved.

The following internal characters are given by Regan (1911, p. 560) :—

“Palatine short and broad, articulating with an antero-lateral facet of the lateral ethmoid; pterygoid absent; mesopterygoid small, connecting the large metapterygoid with the vomer; hyomandibular with a broad head, articulating with pterotic and sphenotic. Lateral ethmoid with a projection for the attachment of the preorbital and with a slender posterior extension which meets a similar forward extension of the sphenotic, so that the frontal has no free edge. Post-temporal absent; upper limb of supra cleithrum wedged between pterotic and epiotic, lower running to basioccipital; mesocoracoid present; hypocoracoids tapering forward below, not forming a symphysis. Vertebrae 52 to 75 (10—16+41—56); ribs attached to long parapophyses; sixth vertebra free; anterior and posterior rami of parapophysis of fourth vertebrae connected at the base only, the anterior stout, firmly attached to the limb of supracleithrum; air-bladder free, usually large”.

According to Regan (1911, p. 556) the Siluridae have osteological characters in common with the marine family Plotosidae, to which they are perhaps related. They bear a superficial resemblance to the Schilbeidae, but apparently are structurally quite different.

C.—*Distribution.*

The family is confined to fresh water and is chiefly Asiatic in distribution. The species range from Eastern Siberia and the Amur Basin through Japan, Korea, and China south into the Malay Peninsula and eastward in the East Indies to Palawan, the Calamianes Group, Borneo, and Java. Westward the family ranges throughout Siam, Burma, and India to Asia Minor. There are only two European species, *Silurus aristotelis* (Agassiz) in Greece and *S. glanis* Linnaeus, which ranges over a large part of Europe and eastward to the Aral Basin, the Amu-darya and the Issyk-kul regions. The family does not occur in Africa or in the Central Asiatic Plateau.

D.—*Diagnostic Key to the Genera.*

In the course of this study several modifications in generic concepts have proved to be necessary, which will be discussed in detail under the various genera. Six currently recognized genera have been placed in synonymy. Nine genera altogether are recognized, comprising about 50 species.¹ Diagnoses are based chiefly on my study of specimens, supplemented by the published accounts of Bleeker, Vaillant, Weber and Beaufort, Herre, and Fowler. With the exception of *Hemisilurus*, representatives of all the genera were available to me for study.

- 1a. Mouth inferior; gape wide but very short; supralabial fold extending below eye and at a considerable distance from it; snout truncated, with the anterior nostrils terminal and set close together; posterior nostrils either just above and just anterior to eye or above and far behind eye; anal fin very long, with 90 or more rays; dorsal fin absent in known forms.

¹ No attempt has been made here to work out the speciation exactly.

- 2a. Posterior nostrils above and completely behind eye ; supralabial fold extending to behind middle of eye ; maxillary barbels not osseous and hooked, but sometimes flattened distally into a membrane fringed along one side ; anal rays 90—95. 1. *Hemisislurus*.
- 2b. Posterior nostrils above and just anterior to eye ; supralabial fold barely to below middle of eye ; maxillary barbels short, heavy, osseous, and hooked ; anal rays 103—110 2. *Ceratoglanis*.
- 1b. Mouth terminal, the lower jaw projecting to slightly shorter than upper ; supralabial fold, if extending below eye, very close to it ; snout not abruptly truncate ; anterior nostrils not terminal ; posterior nostrils never behind eye ; anal fin with 95 or fewer rays.
- 3a. Teeth large, arrow-shaped, wide-set, in regular rows ; head permanently upturned-at an angle of 60° or more from horizontal, the snout-tip above the dorsal contour of the fish ; head and thorax at pectorals triangular in cross-section, flat below ; cross-section of head sharply angular on median line above ; pectoral fin base very long, at least 10 per cent. of standard length, the ray-bases widely spaced ; length of pectoral fin more than 25 per cent of standard length. . 3. *Belodontichthys*.
- 3b. Teeth conical, small, never arrow-shaped or especially wide-set ; head never normally upturned ; head flat above, neither head nor thorax triangular in cross-section ; pectoral fin base short, 7 per cent. or less of standard length, the ray-bases closely approximated ; length of pectoral fin 20 per cent. or less of standard length.
- 4a. Rays of anal fin excessively long, those at middle of the fin as long or longer than the distance from their bases to the dorsal contour of the fish, the rays covered for more than half their length by integument and muscles ; anal completely confluent with caudal ; head very short, 6 or more in standard length ; gillrakers rudimentary, reduced to knobs, few in number, and set very far apart. . . 4. *Silurichthys*.
- 4b. Rays of anal fin much shorter, those at middle of fin not as long as the distance from their bases to the dorsal contour of the fish ; anal free from caudal or narrowly connected with it, but the two never completely confluent ; head usually longer, 6½ or less in standard length ; gillrakers long or short, but never all reduced to knobs, few or many in number.
- 5a. Caudal fin rounded, truncate, or weakly emarginate medially with very bluntly rounded lobes ; maxillary barbels heavy, flattened ; body compressed but robust anteriorly ; anal rays covered by integument for more than half their length ; pectoral spine stout, the fin not surpassing origin of the anal ; gape horizontal to somewhat oblique. 5. *Silurus*.
- 5b. Caudal fin plainly forked, or deeply emarginate with pointed lobes ; maxillary barbels slender.
- 6a. Eye with a free orbital rim, above level of the corner of the mouth and not visible from underside of head ; gape oblique, wide and very long, reaching to or beyond anterior border of eye ; dorsal with 5 rays ; pectorals not reaching beyond origin of anal. 6. *Wallago*.
- 6b. Eye subcutaneous, opposite corner of mouth or ventral border on a level with it, usually not visible from underside of head ; gape not surpassing anterior border of eye ; dorsal with 1—4 rays or none.
- 7a. 3 or 4 dorsal rays ; gillrakers 15 or less on long limb of gill arch, shorter than the branchial filaments ; gape straight to sharply oblique ; eye opposite corner of mouth or its ventral border on a level with it.
- 8a. Gape horizontal, rather long but not reaching anterior border of eye ; jaws equal or lower slightly shorter ; eye opposite corner of mouth, a small portion visible from underside of head ; teeth often present on palatines ; pectoral fin short and broad, not surpassing origin of anal, its spine strongly pectinate on inner margin 7. *Hilo*.
- 8b. Gape sharply oblique, not surpassing anterior border of eye ; jaws equal or lower prominent ; ventral border of eye on level with corner of mouth, or lower, and usually visible from underside of head ; teeth never present on palatines ; pectoral fin usually surpassing origin of anal, its spine pectinate or smooth. . 8. *Ompok*.
- 7b. 1 or 2 dorsal rays or none, the rays, if present, very short ; gillrakers 15 or more on long limb of gill arch, long, curved, and slender, usually as long as the branchial filaments ; gape straight to somewhat oblique, very short, not reaching the anterior border of the eye ; eye large, opposite corner of mouth and visible from underside of head 9. *Kryptopterus*.

While the genera are quite distinct from one another and for the most part distinguishable at a glance, still it is hard to express their differences in key form without some use of artificial characters. This is especially true with the genera *Silurus*, *Hito*, *Ompok*, and *Kryptopterus*. A thorough osteological study would probably reveal other distinguishing characters of a less artificial nature.

A TENTATIVE REVIEW OF THE GENERA OF SILURIDAE.

1. Genus *Hemisilurus* Bleeker.

Body strongly compressed; head depressed, with truncated snout. Mouth inferior, transverse, gape wide but very short; supralabial fold extending beyond middle of eye and at a considerable distance from it. Anterior nostrils close together, tubular, in front of the truncated snout. Posterior nostrils above and completely behind the posterior border of the eye. Eyes subcutaneous, above and behind corner of the mouth, not visible from underside of head. Maxillary barbels flexible, rather short, in females sometimes longer and flattened distally into a membrane which is fringed along one side. One pair of mandibular barbels, very small. Teeth in jaws short, in broad bands. Vomerine teeth in two patches. No teeth on palatines. Gillrakers 10-12 on the long limb of the gill arch. Anal free from caudal, which is deeply forked, the two lobes about equal. Dorsal fin entirely lacking. P. I, 15-I, 17; V. 8-9; A. 90-95; B. 10-12.

This genus, with the possible exception of *Ceratoglanis*, is probably the most highly specialized of all the silurid genera, and it is unfortunate that no specimen of it was available for this study. Particularly specialised characters include the position of the posterior nostrils; total lack of a dorsal fin; rudimentary mandibular barbels; inferior mouth; truncated snout; and a certain amount of sexual dimorphism, as exhibited in at least one species (*H. moolenburghi* Weber and Beaufort) in which the maxillary barbels of the female are modified.

Three species now fall within the scope of the genus: *H. chaperi* (Vaillant), Borneo; *H. heterorhynchus* (Bleeker), Sumatra and Borneo; and *H. moolenburghi* Weber and Beaufort, Sumatra and Borneo.

Bleeker (1853a, p. 514) described a new species, *Wallago heterorhynchus*, from Sumatra. In 1858 (p. 295) he erected the genus *Hemisilurus*, to include those forms having the vomerine teeth in two separate patches, and no dorsal fin or mandibular barbels.* He included *H. heterorhynchus* and *H. schilbeides* (the latter now carried in *Kryptopterus*) in this genus.

In his *Atlas* (1862a) Bleeker gave another diagnosis of the genus and species. To the two species already included in the genus he added a third, *H. scleronema* (now placed in *Ceratoglanis*). The latter species was again described as new in another paper of the same year (1862b, p. 74), but the *Atlas* was apparently published first.

Günther (*loc. cit.*, p. 41) removed *H. schilbeides* Bleeker from the genus, transferring it to *Kryptopterus*.

*Forms which he included do often have mandibular barbels, which Bleeker failed to notice.

Vaillant (1891, p. 182) described a new genus and species, *Diastatomycter chaperi*, from Borneo. He gave only a brief diagnosis, but remarked on the singular position of the posterior nostrils, far behind the eye, and that aside from this character his species seemed to be closed to *Hemisilurus scleronema* Bleeker. In 1893 Vaillant (pp. 60-61) again gave a diagnosis of his new genus and species. He said that it was like *Hemisilurus scleronema*, according to Bleeker's description and plate in his *Atlas*, but differed in having mandibular barbels, and in the position of the posterior nostrils. The illustration in the *Atlas* of *H. scleronema* shows the posterior nostrils directly behind the anterior ones, separated from them only by the maxillary barbels. Vaillant suggested that Bleeker's type should be re-examined to see if his description and plate were accurate in regard to the mandibular barbels and nostrils.

In the same year, Vaillant (1893a, pp. 66-71) gave a long and thorough description of *Diastatomycter chaperi*. He remarked that he had definitely established that the type of *Hemisilurus heterorhynchus* (Bleeker) also had the posterior nostrils behind the eye; he commented on the fact that Bleeker never mentioned this character, and that the nostril was not drawn at all in the figure† in his *Atlas*. On this basis Vaillant said that *H. heterorhynchus* should be transferred to the genus *Diastatomycter*, leaving *H. scleronema* alone in *Hemisilurus*. However, before taking this step he wanted to make sure of the accuracy of Bleeker's drawing of *H. scleronema*; and if the posterior nostrils did turn out to be behind the eye, all three species should be in *Hemisilurus*, this name having priority.

Vaillant (1902, pp. 50-51) again brought up this problem. He had acquired one specimen each of *H. heterorhynchus* and *H. scleronema* from Borneo, and had examined the types of all three species in question. He pointed out that the character of the posterior nostrils in *H. heterorhynchus* was a means of separating it from *H. scleronema*. He had definitely established the fact that the position of the nostrils in the latter species was not as shown in Bleeker's figure, but instead was much further back, above the front border of the eye. Vaillant tentatively returned the species to the genus *Hemisilurus*, remarking that he did not wish to make systematic changes at that time on the basis of the posterior nostrils, but suggesting that other workers should study this problem.

Weber and Beaufort (1913, p. 210) somewhat expanded the diagnosis of *Hemisilurus*, to allow for the presence of mandibular barbels, which are generally present but minute. Besides *H. scleronema*, *H. chaperi*, and *H. heterorhynchus*, they included a new species, *H. moolenburghi*, from Sumatra. In the female of this form the maxillary barbels are modified, distally flattened with one border split into long threads. Probably studies of large series of each of the species should be made eventually to see whether this condition occurs in other species than *H. moolenburghi*.

Myers (1938, p. 98) took the step of removing *H. scleronema* to its own genus, *Ceratoglanis*, leaving but three species in *Hemisilurus* to date.

†It might be added that, from this figure, one would never recognize the fish's resemblance to *Diastatomycter chaperi* Vaillant or to *Hemisilurus scleronema* Bleeker.

2. Genus *Ceratoglanis* Myers.

Body strongly compressed; head depressed, with truncated snout. Mouth inferior, transverse, gape wide but very short; supralabial fold extending to below middle of eye and distant from it. Anterior nostrils close together, in front of the truncated snout, in short tubes which are directed forward. Posterior nostrils barely valved, above the anterior border of the eye. Eyes subcutaneous, above and behind corner of mouth, not visible from underside of head. Maxillary barbels short, hooked, and bony, originating immediately posterior to the anterior pair of nostrils. One pair of mandibular barbels, minute. Teeth in jaws very small, in broad bands. Vomerine teeth in two small rounded patches. No teeth on palatines. Gillrakers short, stiff, and wideset, about 10 on the long limb of the gill arch. Anal free from caudal, which is deeply forked. Pectoral spine smooth. Dorsal fin entirely lacking.

P. I, 15-I, 16; V. 8; A. 103-110; B. 10-11.

In 1938 (p. 98) Myers took the step, previously suggested by Vaillant, of erecting a genus for *H. scleronema*, which differs from the other members of *Hemisilurus* in the position of the posterior nostrils and the structure of the maxillary barbels. It also has a greater number of anal rays the largest number for any member of the family.

The single species of *Ceratoglanis* is known from Sumatra, Java, and Borneo; Smith (1931, p. 181) reported one specimen from Siam.

I have examined the specimen in the U. S. National Museum, from Mandan River, Siak, Sumatra, which was mentioned by Myers (1938, p. 98). It agrees with the published descriptions of the species, except for the possession of 110 rays in the anal fin; no published accounts I found gave the number as over 105.

Bleeker, in describing *Hemisilurus scleronema* (1862a) noted the unusual hooked barbels and separated the species from *H. heterorhynchus* on this basis, but, as Vaillant (1902) commented, he failed to note the most striking difference between the two, that of the position of the posterior nostrils.

Perhaps the confusion surrounding this character, and its being so often overlooked or wrongly figured, is due to the fact that in *Ceratoglanis scleronema* and in the three species of *Hemisilurus* there are numerous mucus ducts on the mandible, which could easily be confused with the barely-valved posterior nostrils, if they were not examined carefully.

3. Genus *Belodontichthys* Bleeker.

Body strongly compressed. Head compressed, keeled, depressed only at tip of snout; head and thorax triangular in cross-section, flat below. Head permanently upturned. Gape long, at an angle of about 60-80° from horizontal. Anterior nostrils wide-set, in long tubes; posterior pair valved. Eyes sub-cutaneous, morphologically above corner of mouth, but actually low-set, just posterior to the corner, not visible from underside of head. Maxillary barbels short, extending to ventrals or a little farther. Two mandibular barbels, shorter than eye. Teeth in jaws large, arrow-shaped, and wide-set, in three regular rows

in each jaw, those of the outer row shorter and set at a different level outside the mouth. Vomerine teeth very small, in two small patches. No teeth on palatines. Gillrakers short, stiff, elongate-conical, rather widely spaced, about 30 on long limb of gill arch. Anal free from caudal, which is deeply forked, the upper lobe the longer. Dorsal fin very short, about once in eye. Pectoral fin long, extending well into anal, about $\frac{1}{3}$ - $\frac{1}{4}$ of standard length, as compared with $\frac{1}{6}$ or less in other genera; its spine not toothed. Base of pectoral very long, supported by strong muscles, about 10 per cent. of standard length (7 per cent. or less in other genera).

D. 4; P. I., 18-I, 22; V. 9-10; A. 85-96; B. 13-15.

Bleeker (1851b, p. 202) described a new fish from Borneo, *Wallago dinema*. The name *Wallago* was used for the first time in this paper (p. 198) for this fish and one other, *Wallago mülleri*, but no generic diagnosis was given. The species *Wallago dinema* was described in no great detail, yet enough to identify the fish with certainty; for example, Bleeker mentioned the arrowed teeth and the long pectoral fins, although he erroneously described the head as being depressed.

Bleeker used the name *Wallago* in a loose sense for several Siluroid fishes until his first revision of the catfish groups in 1858, when he restricted it to two species, *W. russellii* and *W. leerii*, and placed his *W. dinema* in a new genus, *Belodontichthys*. He gave a longer and more thorough description of the fish, including the character of the keeled head, and extended its range to Sumatra. He made one change, however, which was a violation of the rules of nomenclature; he renamed the species *B. macrochir*, making *Wallago dinema* a synonym of it. He apparently preferred the new name because it was more descriptive of the unusual pectoral fins; nevertheless, under the International Rules of Zoological Nomenclature, this name cannot be allowed to stand. Weber and Beaufort (1913, p. 204) returned to the original and correct specific name, *dinema*, making *macrochir* a synonym of it.

Bleeker (1862, p. 394) named *B. macrochir* as the genotype of *Belodontichthys*. In his *Atlas* (1862a, p. 80) he gave another comprehensive diagnosis of the genus and species. The accompanying illustration is very poor, not agreeing well with either Bleeker's descriptions or with the actual appearance of the fish.

Hora (1936, pp. 207-8), in a discussion of *Wallago* as a generic name, pointed out that the name *Wallago* was first used in connection with the description of *W. dinema* Bleeker (1851b, p. 202), though the genus itself was not diagnosed, and that, in accordance with strict interpretation of the International Rules of Zoological Nomenclature, the name *Wallago* should be used in place of *Belodontichthys* and a new name proposed for *Wallago attu* and other species included in *Wallago* with it. For the time being, however, Hora preferred to retain the name *Wallago* for the fishes currently so called.

Myers (1938, p. 98) again raised this question of nomenclature, concluded that the generic name *Wallago* properly belonged with *Belodontichthys dinema*, and proposed the new genus *Wallagonia*, with *Wallago*

leerii as the genotype, for fishes previously carried in *Wallago*. Subsequent authors such as Smith (1945) concurred in this view of the problem.

More recently, however, Myers examined Bleeker's paper (1851b), which had not been available to him before and the information contained in which he had obtained from Weber and Beaufort's index to Bleeker's papers (*Fishes of the Indo-Australian Archipelago, Volume I*). It turned out that the first use of the generic name *Wallago* was not on p. 202 of this paper, as Weber and Beaufort's index had indicated, but rather on p. 198, where *Wallago* was used in connection with two species, *W. mülleri* as well as *W. dinema* (see above, p. 12). In a later note (1948, pp. 19-20) Myers remarked on this fact and that, contrary to the views expressed by him in 1938, *dinema* could not be accepted as the monotype of *Wallago*, since two species were associated with the generic name upon its first appearance. Bleeker (1862, p. 394) designated *W. attu* as the genotype of *Wallago*, and *Belodontichthys* must stand as the generic name for *dinema*. Apparently Hora (1936) also drew his conclusions from Weber and Beaufort's index thereby falling into the same error as Myers.

Belodontichthys dinema (Bleeker) is a common and well-known fish in regions where it occurs, notably Borneo, Sumatra, Siam, and the Malay Peninsula. Its large pectoral fins, large mouth, and long, sharp teeth make it ideally adapted for rapid swimming and voracious feeding.

Belodontichthys javanensis from Java, described by Hardenberg (1938, p. 311), cannot belong to this genus, judging from the description, and probably should enter the genus *Ompok* (see p. 36).

4. Genus *Silurichthys* Bleeker.

Body compressed. Head depressed, very short, $6\frac{1}{2}$ - $7\frac{1}{2}$ in standard length. Mouth horizontal or very slightly oblique; gape very short, but reaching to or beyond anterior border of eye; upper jaw slightly longer. Anterior nostrils tubular, wideset. Posterior nostrils valved, before anterior border of eye. Eyes subcutaneous, well above corner of the mouth, and very small, 5-8 in head length. Maxillary barbels rather heavy, reaching about to middle of anal. Mandibular barbels longer than head, sometimes reaching origin of anal or beyond. Teeth in jaws short, in broad bands. Vomerine teeth usually in a single rounded patch, sometimes in two slightly separated patches. No teeth on palatines. Gillrakers rudimentary, sometimes consisting only of small knobs, set very far apart, not more than about 5 on the long limb of the gill arch. Anal completely confluent with caudal, which is obliquely emarginate, the upper lobe longer. Rays of anal excessively long, those at middle of the fin as long as or longer than the distance from their bases to the dorsal contour of the fish, the rays covered for more than half their length by integument and muscles.

D. 4; PI, 8-1, 11; V. 6-7; A. 48-67; B. 9.

Silurichthys is a distinct and well-defined genus, the diagnostic characters of which make it easily recognizable.

However, the status of the various species is by no means clear. Bleeker (1851c, p. 428) described *Silurus phaiosoma*, transferring it in 1858 (p. 269) to his new genus *Silurichthys*. Among other characters, *S. phaiosoma*, from Borneo, Biliton, and Banka, was stated as being brown in colour, with caudal fin $4-4\frac{2}{3}$ in body length, and dorsal and ventral fins opposite. At the same time (1858, p. 270) Bleeker described another species, *Silurichthys hasseltii*, from Java, a mottled form with a shorter caudal fin (6 in body length). In his key (p. 269) it was stated that in both these forms the dorsal and ventral fins are opposite, and the two were differentiated on the basis of their colour, and the fact that in *S. phaiosoma* the caudal fin is somewhat forked, while in *S. hasseltii* it is not.

At the time this description was written, Bleeker had not seen a specimen of *S. hasseltii*, basing his description on a figure by Hasselt. In his *Atlas* (1862a, p. 81) he again diagnosed his two species and, having meanwhile seen the type of *S. hasseltii*, corrected his description for this form. *S. phaiosoma* was now described as having dorsal and ventral fins opposite, and being of a uniform dark brown; *S. hasseltii* as having the dorsal in advance of the ventrals, and being mottled. Bleeker's coloured plates in the *Atlas* confirm this, if they can be considered accurate. *S. hasseltii* has also been described in 1858 as having the depth $7\frac{1}{3}$ in the length; in the later paper this was corrected to $6\frac{1}{2}$ in the length.

Vaillant (189a, p. 63) recorded *S. hasseltii* Bleeker from Borneo. He expressed the opinion that the two species of *Silurichthys* should be united, and that skin colour and position of dorsal fin were of insufficient importance to justify their separation.

Volz (1904, p. 263) described *Silurichthys schneideri* from Sumatra, which is close to *S. phaiosoma* (Bleeker) except that there is a greater number of anal rays; the colour was not given, but was presumably dark brown. The gape of the mouth was described as reaching the front border of the eye.

Weber and Beaufort (1913, p. 198), putting *S. schneideri* Volz with the doubtful species, remarked that it was like *S. phaiosoma* (Bleeker) except for the different number of anal rays, and the fact that the gape of the mouth reached the front border of the eye and not the middle. Bleeker had not mentioned the extent of the gape in *S. phaiosoma*, but his figure in the *Atlas* certainly does not show it reaching much beyond the front border of the eye. Weber and Beaufort's figure (p. 77) shows the gape reaching much farther.

Hora and Gupta (1941, p. 16), after an examination of specimens, thought that the differences in gape and anal count held good, but that *S. schneideri* should be considered a distinct species. Their figure of *S. schneideri*, however, shows a gape no shorter than does Bleeker's figure of *S. phaiosoma*. They extended the range of *S. schneideri* to the Malay Peninsula (Perak).

Silurichthys indragiriensis, also described by Volz (1904, p. 464), would seem to resemble *S. hasseltii* Bleeker except for a fewer number of anal rays and a stouter body (depth 5 in length instead of $6\frac{1}{2}$). It was described as being mottled. Weber and Baufort (1912, p. 534), in

reporting *S. phaiosoma* for the first time from Sumatra, commented that *S. indragiriensis* Volz may be identical with *S. phaisomoa* (Bleeker). They said that the two species did not seem to differ much, but they made no comparison of the colour character of the two. In 1913 (p. 199) they placed *S. indragiriensis* as a doubtful species.

Weber and Beaufort (1913, p. 197) reported *S. phaiosoma* for the first time from "Malacca," including a figure which showed an exceptionally long caudal fin but which otherwise agreed with Bleeker's description. The gape is longer than that shown in Bleeker's figure in the *Atlas*.

Smith (1933, p. 77) reported the first record of *S. phaiosoma* from Siam. It is a question just what form he had when he made this report. His 1945 publication (p. 334) gave a description which is in accordance with Bleeker's. Smith's accompanying figure, however, is clearly of an example of *S. hasseltii* or *S. indragiriensis*, with mottled body and dorsal fin in advance of the ventrals. I examined no specimens of *Silurichthys* from Siam, so just what forms do occur in that region is not clear to me.

Fowler (1934, p. 87) listed *S. phaiosoma* among species from Siam, but gave no description which would support the identification.

Fowler (1939, p. 56) described *S. leucopodus* from Trang, Siam. It is apparently close to *S. schneideri* Volz, differing mainly in having the dorsal in advance of the ventrals, and in its white ventral fins and white-bordered pectorals, and rounded caudal fin.

From the literature available to me, the following general conclusions can be drawn as to the distinguishing characters of the various named species :

	<i>phaiosoma</i>	<i>hasseltii</i>	<i>schneideri</i>	<i>indragiriensis</i>	<i>leucopodus</i>
Described	Blkr. 1851c Blkr. 1858 Blkr. 1862a	Blkr. 1858 Blkr. 1862a	Volz 1904	Volz 1904	Fow. 1939
Colour	Uniform dark brown, fins darker	Mottled	Apparently dark brown	Mottled	Uniform dark brown ; white V and P borders
Relationship D- V	Opposite	D. forward	Opposite	D. forward	D. forward
Depth in body length	6-6½	6½	6½	5	6
Caudal	4-4½ in body 1. (Blkr.) 2½ in body 1. (W & B) Not deeply emarginate	5-6 in body 1. Oblique to emarginate	L. somewhat greater than body depth Oblique to emarginate	?	42/5 body 1. Rounded.

Anal rays	53-58	58	64	49	67
Corner mouth	?	?	To front of eye	To mid. of eye	To front of eye
Range	Banka Biliton Borneo Sumatra Malay Siam?	Java Borneo Malay?	Sumatra Malay (Perak)	Sumatra	Siam

The question remains just which of these characters are valid.

Colouration.—Great intraspecific colour variation exists among fishes. On the other hand, with these forms, the rule seems to be either definitely solid brown or distinctly mottled. It might be of value to know whether the mottled forms habitually live in shaded forest streams, and the solidly coloured ones in more open water.

The colouration of the fins seems to be more variable, so whether the presence of white ventrals in the case of *S. leucopodus* has any particular significance is doubtful.

Relationship of dorsal to ventral.—In the opinion of Hora and Gupta (*op. cit.*), this character seems to hold in at least one case; the earlier writers expressed their doubts about it.

Depth in body length.—This undoubtedly varies with age of the fish and other factors. The depth of 42 mottled specimens from Johore and Singapore which I examined varies from about $5\frac{1}{2}$ to $6\frac{1}{2}$ times in body length.

Caudal.—Undoubtedly the length and the degree of emargination will vary with individuals. As for Fowler's *S. leucopodus* with a rounded caudal, only one specimen being known, this condition might be natural or might equally well be due to an injury of the fin.

Anal rays.—Most recorded counts seem to fall within a range of 53-58. *S. indragiriensis* is reported to have 49; I have at least five specimens of *Silurichthys* with a count of 48 or 49, in a series ranging from that up to 57. *S. schneideri* and *S. leucopodus* have counts of 64 and 76, respectively, in Volz's and Fowler's descriptions. Hora and Gupta gave no counts for their specimens of *S. schneideri*, but said they agreed with Volz. Further collections may reveal counts ranging between 58 and 64; within a species all through the family I have found considerable variation in this respect. On the other hand there may be a distinct break between the ray counts in these forms.

Gape.—Over this character there seems to be a considerable amount of confusion and uncertainty. According to Hora and Gupta, it holds in defining and separating *S. schneideri* (gape to front border of eye) from *S.*

phaiosoma (gape to middle of eye). However, as mentioned above, there is nothing in Bleeker's description to indicate the extent of the gape in the latter species, while his plate shows it no longer than does Hora and Gupta's plate of *S. schneideri*. In any case, it would seem that the difference would not be much, since *Silurichthys* has such a small eye set so far forward in the head. The series of mottled specimens I examined, 42 individuals from Singapore and Johore, showed variation in this respect, although other characters such as the forward dorsals held good throughout. It seems to me that the validity of the length of the gape as a character for separating species in this genus is doubtful. At any rate there is much confusion as to its use.

Disregarding this, and setting up the other characters in the form of a key, the species work out as follows :

- 1a. Body mottled ; dorsal in advance of ventrals
 - 2a. Depth $6\frac{1}{2}$ in body length ; anal ray 58 *S. hasseltii* Blkr.
 - 2b. Depth 5 in body length ; anal rays 49 *S. indragiriensis* Volz.
- 1b. Body solid dark brown.
 - 3a. Dorsal opposite ventrals.
 - 4a. Anal rays 53-58 *S. phaiosoma* (Blkr.)
 - 4b. Anal rays 64 *S. schneideri* Volz.
 - 3b. Dorsal in advance of ventrals ; anal rays 67 ;
caudal rounded *S. leucopodus* Fowler.

In my series of mottled specimens, the character of dorsal in advance of ventrals held throughout, although the difference was not great. The depth varied from about $5\frac{1}{2}$ to $6\frac{1}{2}$ in body length, and the anal count was a spread of 48-57. The length of the caudal fin varied somewhat with individuals, as did the degree of emargination. If the colour character turns out to be sound, I think it very probable that *S. hasseltii* and *S. indragiriensis* are identical, and the latter name must then be reduced to synonymy.

It is the belief of Hora and Gupta (*op. cit.*) that *S. phaiosoma* and *S. schneideri* are distinct. This conclusion will be borne out if there turns out not to be a range of anal ray counts between those given for the two species. *S. leucopodus* may be an aberrant example of *S. schneideri*, but if the position of the dorsal holds as a good specific character, it is probably distinct also. The taking of further specimens of *S. leucopodus* may answer this question one way or the other.

One dark brown specimen available to me for examination, apparently a typical *S. phaiosoma*, had an excessively long caudal fin like that figured in Weber and Beaufort (1913).

5. Genus *Silurus* Linnaeus.

Body compressed ; head broad, depressed. Mouth horizontal or somewhat oblique ; gape long and wide, sometimes surpassing hindborder of eye. Jaws equal, or one jaw or the other longer. Anterior nostrils tubular, wideset ; posterior nostrils before anterior border of eye. Eyes subcutaneous or with a free orbital rim, above corner of mouth and not visible from the under side of the head. Maxillary barbels rather heavy, flattened, varying in length. Mandibular barbels normally two or four

in number. Teeth in jaws short, forming broad bands. Vomerine teeth in one patch or two. Gillrakers short, about 8-10 on long limb of the gill arch. Anal free from caudal or narrowly to rather broadly joined with it, the anal rays covered by integument for most of their length. Caudal rounded to weakly emarginate with bluntly rounded lobes. Pectoral spine stout, either denticulate or smooth on inner margin.

D. 2-7 ; P. I, 10-I, 17 ; V. 7-13 ; A. 50-92 ; B. 12-15.

For a long time after Linnaeus the name *Silurus* was used for all the catfishes known, with the exception of the armoured forms. All of Bleeker's early East Indian catfish species, and most of those of Cuvier and Valenciennes and other authors, were named as various species of *Silurus*, and were later transferred by Bleeker to other genera as he erected them. The genus *Silurus* was finally restricted by Bleeker (1862, p. 393) to forms with 6 barbels, vomerine teeth in two patches, eyes subcutaneous, anal united to caudal, 15 branchiostegals, and ventrals I, 10 or I, 11. This grouping included forms like *Silurus glanis* Linnaeus. In the same paper (p. 392) Bleeker proposed the new genus *Parasilurus*, with *Silurus japonicus* Temminck and Schlegel as the genotype. He distinguished this genus by the strong toothed pectoral spine, eyes with a free rim, one band of vomerine teeth, a rounded caudal, and 14-15 branchiostegal rays.

Silurus and *Parasilurus* were accepted as distinct genera by most subsequent authors. Hora (1936a, p. 352), however, did not consider the differences between them of sufficient generic value. He found, for example, that the character of vomerine teeth in one patch or two could not be used ; in a series of *P. cochinchinensis* Cuvier and Valenciennes, he was able to show that the teeth occurred in the typical one patch in some specimens, but that in other specimens these teeth were in two patches and in still others they intergraded between the two extremes. Intraspecific variation in respect to vomerine teeth seems to occur throughout the family.

The character most used and most readily observable for distinguishing the two genera is the presence in *Silurus* of 6 barbels, and in *Parasilurus* of 4. Kimura (1935, p. 105) and Hora in the above paper (p. 352) both cited research of Atoda (1935) on the embryology of *Parasilurus asotus* (Linnaeus), from which it appears that as larvae these fishes have an extra pair of mandibular barbels which is resorbed during ontogeny. It does not seem advisable to separate genera on the basis of a character which is dependent upon physiological growth factors. Especially does this seem indicated since it can be shown that in small populations of normally 4-barbelled forms, a few individuals may appear with 6 barbels ; this is probably due to absence in these individuals of the growth-inhibiting factor for the extra pair of barbels.

Bhimachar and Rau (1941) discovered considerable variation in the number of mandibular barbels in specimens of *Silurus cochinchinensis* from southern India (see p. 24). I found such variations in a series of specimens of *Hito taytayensis* Herre (see p. 31). In view of the considerable amount of evidence against the validity of number of barbels and

distribution of vomerine teeth as generic characters in these fishes, it seems best to discard them and to include all species of both genera in *Silurus*.

As for the species in the genus, considerable confusion exists and the number of valid forms cannot be stated definitely at this time, although much work has already been done along this line.

By far the best-known form is the 6-barbelled *Silurus glanis* Linnaeus, type of the genus and family. This species is common in the rivers of Europe from the Danube eastward, and occurs more rarely in parts of France, Switzerland the Netherlands, Finland, and Sweden. It is a well-known fish wherever it occurs, chiefly due to its giant size, and a great volume of literature has been written concerning it from the standpoint of anatomy, life history, and economic value. Considering all the available information about this fish, there seems little need to do more than mention it here.

For significant accounts of *Silurus glanis* see, for example, Cuvier and Valenciennes (1839, pp. 323-351), Heckel and Kner (1858, pp. 308-312), Fries *et. al.* (1895, pp. 693-702), and Thompson (1947, pp. 43-46, 233-235). It has been identified with accounts of fishes by a number of ancient Grecian authors.

Another European representative of the genus is *Silurus aristotelis* (Agassiz) with 4 barbels, restricted to Greece and parts of Asia Minor. The history of the species is of special interest because of the long period of confusion surrounding its identity. For a full account of the history of this fish, see Gill (1907, pp. 5-13) and Thompson (*op. cit.*).

Tchang (1936, p. 37, and 1937, p. 143) made *S. aristotelis* a subspecies of *S. asotus*. Considering the gap between the limits of distribution of the two species, I cannot see how this conclusion can be considered valid.

S. glanis and *S. aristotelis* are apparently the only members of the genus and family in Europe, although Sauvage (1882, p. 163) described *Silurus chantrei*, with 4 barbels (judging from the figure), from the River Kura, Tiflis, U. S. S. R. Apparently this form has never been rediscovered since the original specimen was taken. It is barely mentioned by Berg (1933, p. 587), who remarked, without giving a reason for his statement, that the type locality record was erroneous and that the fish in reality was collected in Syria or the basin of the Tigris River.

Silurus asotus Linnaeus, with 4 barbels, is the common form of China and Japan. A number of other Chinese forms have been named, most of which are apparently synonyms of subspecies of *S. asotus*; the exact relationships of these forms are still very uncertain. Nichols (1943, pp. 33-35) made subspecies of *S. bedfordi* Regan, from Korea, and Wu (1930, p. 225) described *Parasilurus asotus longus* from Tchekiang. *S. grahami* Regan and *S. mento* Regan, both from Yunnan, are close to *asotus* and will probably eventually be placed as subspecies of it. Rendahl (1928, p. 159) doubtfully put these two in the synonymy of *S. asotus*, while Nichols (*loc. cit.* p. 34) listed them as distinct species.

Silurus cinereus (Dabry) from the Yangtse-kiang, was considered by Rendahl (1928, p. 161) as a valid species. He also (p. 162) mentioned

Silurus sinensis McClelland from Chusan, which he considered might have to be made a subspecies of *asotus*. Nichols (*op. cit.*) also considered *cinereus* distinct, though close to *S. asotus*. *S. sinensis* he placed doubtfully in the synonymy of his *Parasilurus asotus asotus*.

Silurus cochinchinensis Cuvier and Valenciennes, with 4 barbels, is a wide-ranging species, extending from the southern foothills of the Himalayas in India to Burma, Cochin-China, southern China, and peninsular Siam. Hora and Gupta (*loc. cit.*, p. 18) also reported a single specimen of *S. cochinchinensis* from Baling, Kedah State, British Malaya, the first record for the Malay Peninsula. It is a considerably variable form, with a number of synonyms. Hora (1936a, pp. 351-356) discussed the status of the species in India, and with it synonymized *S. afghana* Günther, *Silurichthys berdmorei* Blyth, and *Pterocryptis gangetica* Peters. Hora mentioned the fact that anal ray counts in his specimens varied from 50 to 78. He seems to have examined a large series of specimens, but unfortunately made no attempt to list or correlate ray counts according to localities. From the literature, and from the few specimens I have examined, it appears that the anal ray count of Burmese Siamese, Indo-Chinese and Chinese examples of *S. cochinchinensis* is generally under 64, and that of Indian ones usually over 70. These counts should be examined in large series of specimens; if the difference holds, the Indian form will have to be recognized as a valid species or subspecies under the name *Silurus berdmorei*, this being the oldest available name.

Another species which has always been considered distinct is a 6-barbelled form, *Silurus wynaadensis* Day, with a rather restricted range in the hills of southern India. Most that was known of it was from the descriptions and figure of Day (1868, p. 155, as *S. punctatus*, preoccupied; 1873, p. 237; and 1878-88, p. 480, pl. 111, fig. 6). Hora (1936a) discussed this form with other Indian *Silurus*, considering it and *S. cochinchinensis* to be the only two representatives of the genus occurring in India. Bhimachar and Rau (1941) found that young specimens of *S. cochinchinensis* from Mysore State exhibited variation in the number of mandibular barbels, some of them having two pairs and others but one. They did not, therefore, consider the differences between *S. cochinchinensis* and *S. wynaadensis* to be of sufficient taxonomic importance, and *wynaadensis* becomes a synonym of *cochinchinensis*, the range of which is thus extended to southern India.

However, as mentioned above, adequate studies of anal counts and other characters should be made before the limits of *S. cochinchinensis* are definitely set. If the assumption is correct that all the Indian, Siamese, Malayan, Chinese, and Indo-Chinese forms are one species, the range is great enough so that variations correlated with geography must exist which would probably at least justify the erection of subspecies. The accompanying table, of a few specimens of *S. cochinchinensis*, shows some of the observable variations according to locality. Although the sample was far too small to give any conclusive evidence, still the results suggest that variations do exist which should be studied by interested workers with large series of specimens at their disposal.

In 1933, Herre (p. 179) described a new genus and species of silurid catfish from Hong Kong, *Herklotsella anomala*. Re-examination of the holotype and two paratypes during the course of this study makes it evident that this fish is nothing but a *Silurus* either very closely related to *S. cochinchinensis* or identical with it. It agrees with the longer and slenderer examples of *S. cochinchinensis*. Nichols (*op. cit.*, p. 37) on the basis of Herre's description, made it a distinct species of *Silurus* under the name *Parasilurus anomalus*. He separated it from *S. cochinchinensis* on the basis of the equal jaws, instead of the lower jaw being included. However, in reality the lower jaw of *Herklotsella* is slightly included, as in *S. cochinchinensis*. There seems little justification for considering the form anything but *S. cochinchinensis*.

In 1936, Tchang (p. 35) referred a single specimen of a 6-barbelled *Silurus* from Kwangsi, China, to *S. wynaadensis* (i.e., *cochinchinensis*) from the southern Indian peninsula. He again listed *S. wynaadensis* from China in his 1937 paper (p. 142). Hora (1937, pp. 341-343) made a comparison of Tchang's fish (from the illustration) with specimens of *S. wynaadensis*, which was sufficient to show that the two forms are not the same. This left Tchang's Chinese species nameless, and Hora (p. 343) proposed for it the name *Silurus sinensis*. Later, however, his attention having been called to the fact that the name *S. sinensis* was preoccupied, Hora (1938, p. 243) replaced it with *S. gilberti*.

Mori (1936) described *Parasilurus microdorsalis* from Chosen. I had no opportunity to read this paper, so have no idea what the affinities of the species are. I could find no subsequent references to it, either as a species or in synonymy.

As present, then, there seem to be about ten currently accepted species of *Silurus*: *S. glanis* of northern and eastern Europe, with 6 barbels normally present; *S. gilberti*, which may be a distinct 6-barbelled form, or perhaps an anomalous example of a 4-barbelled species; *S. aristotelis* of Greece; *S. asotus* from China and Japan, with a few subspecies; *S. grahami* and *S. mento* from Yunnan, China, and *S. cinereus* from the Yangtse, which will probably turn out to be subspecies of *asotus*; *S. cochinchinensis*, the geographical distribution of which badly needs to be worked out; *S. microrodorsalis* from Chosen, not since reported; and *S. chantrei* from southern Russia or Asia Minor, another doubtful form.

It is clear that, before any definite statement can be made as to the exact number of species and subspecies, their characters, and their individual variations, a thorough study of the whole genus must be made, based on a large series of specimens and a more careful correlation of the results of other workers.

Fowler (1905, p. 463) described a new genus and species, *Apodoglanis furnessi*. This fish is known from a single specimen, collected in Borneo and now in the Museum of the Philadelphia Academy of Natural Sciences. I was not able to examine the type, but judging from the description and

1 Herre's description gives "head 6 to 5.8", but re-measurement shows all three specimens to have the head over 6 in body length.

TABLE I.

Comparative measurements of specimens of Silurus cochinchinensis. The proportional measurements are given in per cent.

	INDIA.	HONG KONG.					HAINAN.			KWANGTUNG.		
Standard length	142	137	92.5	169*	129*	108*	155	126	141	121	101	98
Head-st. 1.	16.9	18.2	19.4	16.5	16.2	16.6	16.7	16.6	16.3	19.0	19.8	20.4
Eye-interorb. sp.	23.0	20.0	21.0	20.0	17.3	21.0	21.4	20.8	25.9	17.3	20.0	20.0
Eye-head	12.5	12.0	11.1	10.7	9.5	11.1	11.5	11.6	15.2	8.6	10.0	10.0
Gape-head	50.0	52.0	44.4	53.5	52.3	38.8	42.3	47.6	47.8	47.8	45.0	40.0
D. to snout-st. 1.	25.3	31.0	31.3	28.1	27.9	25.0	28.8	29.3	29.7	28.0	30.6	31.1
Ventral-st. 1.	7.0	9.4	9.1	—	10.0	10.6	8.3	8.7	9.9	6.6	vestig.	9.6
Pectoral-st. 1.	11.9	14.2	9.6	12.	12.4	12.9	12.5	12.6	12.6	14.0	15.8	13.2
P. base-st. 1.	4.9	5.1	4.3	4.1	4.6	4.6	5.1	4.7	4.9	4.1	4.0	4.0
Caudal-st. 1.	13.0	20.4	16.2	16.5	16.6	15.2	15.4	16.6	17.0	18.1	19.8	20.4
Base anal-st. 1.	58.8	62.7	60.0	65.0	62.5	62.0	61.2	60.7	60.2	59.9	62.3	63.2
Depth-st. 1.	16.1	21.5	15.1	11.2	14.7	11.1	18.0	18.2	14.8	14.8	15.8	18.3
Max. barbels-st. 1.	28.1	37.9	36.7	33.1	34.1	31.9	42.5	39.6	35.4	35.5	33.6	42.8
Dorsal rays	4	4	4	4	4	4	4	4	4	4	4	4
Anal rays	72	62	61	62	62	63	67	65	65	64	61	60
Pectoral rays	I, 13	I, 10	I, 13	I, 10	I, 10	I, 10	I, 13	I, 14	I, 12	I, 11	I, 13	I, 13
Pelvic rays	9	8	10	0	9	9	10	10	9	10	vestig.	10
Branchiostegals	13	12	12	13	13	13	14	13	13	14	12	13

*Holotype and paratypes of *Herklotsella anomala* Herre.

accompanying figure, it would seem to be a typical *Silurus*, differing only in the absence of pelvic fins. It is doubtful whether a new genus should be erected solely on the basis of lack of the pelvic fins, since the phenomenon of individual loss of these fins is widespread among fishes. Until more specimens are procured its validity as a genus must be left in serious doubt, and it is tentatively included here as a species of *Silurus*. If it does indeed prove to be a *Silurus*, the range of that widespread genus will be extended still farther south.

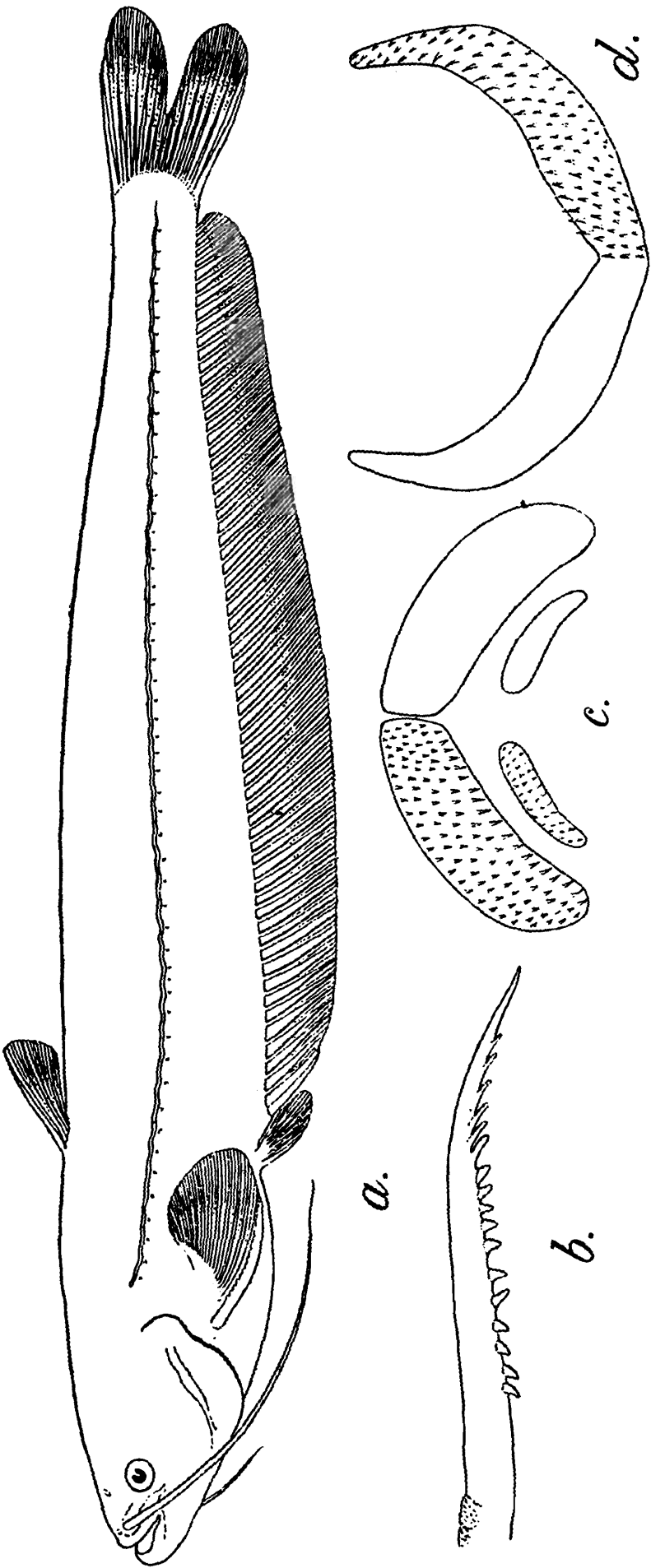
Two specimens in the collections of the Natural History Museum of Stanford University were tentatively labelled as *Ompok bimaculatus*; on examination, however, they proved to be referable to the genus *Silurus*. The specimens were collected in the lowlands of southern India, near the coast, one at Trivandrum, Travancore, and the other at Goa, Portuguese India. The only described South Indian *Silurus* is *S. wynaadensis* (*S. cochinchinensis*; see p. 24), which appears to be restricted to higher altitudes. My two specimens are clearly a quite distinct form, which is here described as new.

It is readily distinguished from *Ompok bimaculatus*, the only other silurid from India with which it might be confused, by the eye set above the corner of the mouth; the heavy, flattened barbels; the thick integument reaching nearly to the end of the anal rays; and the weakly emarginate caudal fin with the lobes bluntly rounded, instead of the fin being forked.

***Silurus goae*, sp. nov.**

Body elongate, compressed, becoming most markedly so posteriorly. Depth at dorsal origin about .20 of standard length (.15-.24). Profile of dorsum evenly convex; ventral profile straight.

Head depressed. Profile of top of head curving downward to tip of snout, the curve in line with that of dorsum, with only a slight concavity at nape of neck. Length of head about .17 of standard length (.16-.09). Gape oblique, upturned at an angle of about 45° from horizontal; wide but rather short, about .35 of head (.33-.37), not reaching front border of eye. Lower jaw slightly longer than upper, contained in dorsal profile of head. Eye small, without a free orbital rim or with the posterior part of the rim appearing slightly free, probably due to preservation. Diameter of eye about .18 of head (.15-.21), about .32 of interorbital space (.26-.38), above and behind corner of mouth. Nostrils wide-set; anterior pair in short tubes, close to tip of snout, about two eye diameters apart; posterior pair valved, about one eye diameter behind anterior pair, three eye diameters apart. Maxillary barbels rather heavy, flattened, reaching to slightly beyond origin of ventrals; one pair of mandibular barbels, slender, short, about .50 the length of head. Teeth in jaws short depressible, in about five or six irregular rows, the inner ones slightly longer and wider-set. Teeth on vomer in two large, crescent-shaped patches, curving downward and outward in line with the jaw teeth, the patches separated from each other by a distance equal to half the length of one patch, or greater; roughly 25-30 teeth in each patch. Gillrakers



2+1+8 or 2+1+9, curved, wide-set, much shorter than branchial filaments.

Dorsal short, first two rays longest, origin opposite that of ventrals, about .28 of distance from tip of snout to base of caudal. Pectorals short, barely reaching origin of anal, base .05 of standard length; the spine is stout, articulated for about the distal half of the length of the fin with the non-articulated portion serrate on inner margin, the serrae being strong, straight, and wide-set. Ventrals small, immediately in advance of anal origin, .06 of standard length. Anal long, last ray distinctly separated from base of caudal by a short interspace, the rays covered by integument almost to their tips, the base of the fin about .66 of standard length. Caudal about .18 of standard length (.15-.21), very weakly emarginate medially and with lobes very bluntly rounded when fin is spread.

Fin formula : D. 4 ; P. I, 12-I, 14 ; V 7-8 ; A. 68. Branchiostegals 13-15.

Colour in alcohol dark brown, darkest on dorsal surface ; fins about same shade as body, darker at their bases ; a blackish spot behind the gill opening ; lateral line and base of anal rays marked with black.

Holotype, 216 mm. in length, from Goa, Portuguese India, Stanford 41889 ; *paratype*, 239 mm., from Trivandrum, Travancore, India, Stanford 41888. Both specimens were obtained by Dr. Albert W. C. T. Herre in 1940-1941.

6. Genus **Wallago** Bleeker.

Body compressed ; head depressed. Mouth oblique ; gape wide and very long, reaching to or beyond anterior border of eye. Anterior nostrils tubular, set far apart. Posterior nostrils valved, before anterior border of eye. Eyes with a free orbital rim, above level of corner of mouth and not visible from underside of head. Teeth in jaws longer and sharper than in most of the genera, in broad bands. Vomerine teeth in two distinct patches. No teeth on palatines. Maxillary barbels long and slender, varying in length. Mandibular barbels normally two in number, filamentous, shorter than head. Gillrakers 9-21 on long limb of gill arch, short, stiff, and wideset, often forked. Anal free from caudal, which is deeply forked to deeply emarginate with pointed lobes. Dorsal rays comparatively long, about equal to pectorals.

D. 5 ; P. I, 12-I, 15 ; V 8-11 ; A. 64-93 ; B. 15-20.

In 1801, Bloch and Schneider (p. 378) described *Silurus attu*, a new catfish from Malabar. The accompanying figure (75) is poor, but shows the long gape which is distinctive of this species.

Bleeker (1846a, p. 284) described this fish as *Silurus mülleri*, from Batavia. Later (1851b, p. 198), in using the name *Wallago* for the first time (see p. 12), he mentioned *Wallago mülleri* Bleeker, evidently the same fish, but gave no characters other than the possession of 4 barbels. In the same year (1851c, p. 427) he described an allied form from Borneo.

W. leerii. A year later (1852, p. 585) he again used the name *Wallago mülleri*, placing *Wallago bimaculatus* (equals *Ompok bimaculatus*) near it and separating it from the latter species by the character of the long gape extending beyond the eye. This character is sufficient to identify it as synonymous with *Silurus attu* Bloch and Schneider.

Bleeker (1853b, p. 108) described *Wallago russellii* from Calcutta and Batavia and included *Silurus attu* Bloch and Schneider, *Silurus boalis* Hamilton, *Silurus wallagoo* Cuvier and Valenciennes, and his own *Wallago mülleri* in its synonymy. It is hard to understand why he proposed a new specific name with several older ones available. In his catfish revision of 1858, Bleeker restricted *Wallago* to *W. russellii* and *W. leerii*, giving a detailed description of each. In his *Atlas* (1862a, p. 79) he returned to the name with the right of priority, *Wallago attu*. His accompanying figure, however, still bore the name *W. russellii*. *Wallago leerii* was also described and figured.

Vaillant (1902, p. 44) described *Wallago miostoma* from Borneo. In the same paper (p. 46) he described *Wallago nebulosus*, which was listed as *Ompok nebulosus* by Fowler (1905, p. 465) and placed in the synonymy of *Wallago miostoma* by Weber and Beaufort (1913, p. 202).

Hora and Misra (in Hora and Gupta, *loc. cit.* p. 18) described a new species of *Wallago*, *W. tweediei*, from Pahang, Malay Peninsula. Since the fish was of great size and could not be totally preserved, its description was based chiefly on plaster casts and photographs. As well as can be determined from the available information, the fish apparently belongs to *Wallago*.

Wallago krattensis, described by Fowler (1934a, p. 335) is referable to the genus *Ompok* (see p. 35).

The four forms belonging to the genus *Wallago* all grow to large size, *W. attu*, from India, Burma, Ceylon, Sumatra, Java, Siam, and Indo-China, is a common and well-known species; it was described in detail by Hora (1939, p. 64). *W. leerii* from Borneo, Banka, and Sumatra, and *W. miostoma* from Borneo, Sumatra, and Siam, are less common, though abundant in certain areas. I found one specimen of *W. miostoma* from Singapore, which appears to be the first record of the fish from this area. *W. tweediei* is known from the one specimen, but apparently the fishermen in the area from which the type was taken are quite familiar with it.

Myers (1938, p. 98) placed these forms in the genus *Wallagoni* restricting the name *Wallago* to the species previously called *Betodentichthys dinema*, but later reversed his decision (see p. 13).

Kner (1864-67, p. 305) described a new genus and species of silurid catfish, *Silurodon hexanema*. Kner himself remarked, and the accompanying figure (pl. 12, fig. 2) confirms, that the fish in general resembles a member of the genus *Wallago*, but differs in several respects. The eye was described as being subcutaneous, the caudal fin is rounded and joined to the anal, the vomerine teeth are in a single patch, and there are two pairs of mandibular barbels, longer than they ordinarily occur in specimens of *Wallago*. These characters this fish shares with members of

the genus *Silurus*. In addition, the single specimen on which the genus was based was said to be collected at Shanghai, which would put it out of the range of any genus but *Silurus*. On the basis of the differences from both *Silurus* and *Wallago*, Kner erected his new genus. I could find no subsequent references to this fish save that of Nichols (*loc. cit.* p. 36), who listed it as a distinct genus and species from China, but made no comment upon it.

In general body form *Silurodon hexanema* resembles *W. attu*, though the gape is too short for this species. Other characters are those of *Wallago*, and except for the differences noted above it seems to fall into this genus.

The specimen probably was not actually collected at Shanghai, but further south; it was in a bottle with another fish from Shanghai, and the data may have been mixed. Poor preservation could account for lack of a free orbital rim; the specimen, as figured, is certainly shrivelled. Cases are known in which silurid catfishes have had their tails injured and regenerated without the typical fork and joined to the anal fin. The occurrence of vomerine teeth in a single patch, or of two pairs of mandibular barbels, has never been reported for a *Wallago*, but anomalies of this sort may be assumed to occur occasionally in this genus, just as they do in many other genera of the family. All things considered, it seems more logical to include the specimen within the genus *Wallago*, until more evidence bearing on the question is produced.

7. Genus *Hito* Herre.

Body strongly compressed; head depressed. Mouth horizontal; gape quite long, but not reaching the anterior border of the eye; jaws equal or lower one slightly shorter. Anterior nostrils tubular, wideset. Posterior nostrils valved, before the anterior border of the eye. Eyes subcutaneous their ventral border on a level with the angle of the mouth and a small portion visible from the underside of head. Maxillary barbels long and slender, extending to origin of anal or less. Mandibular barbels normally two in number, about as long as head, a second hair sometimes present. Teeth in jaws short, in 4 or 5 more or less regular rows, forming broad bands. Vomerine teeth usually in one patch, sometimes completely divided into two patches. A patch of teeth present on each palatine; the patch may be of different sizes on the two palatines, and may be present on one side only, rudimentary with two or three teeth, or lacking altogether. Gillrakers 14-15 on long limb of gill arch, slender, about $\frac{1}{2}$ as long as the branchial filaments. Anal free from caudal, which is forked, or last ray of anal joined to it by a membrane. Pectoral spine strongly denticulate on inner margin.

D. 3-4; P. I, 11-I, 13; V. 6-8; A. 55-68; B. 12-14.

Herre (1924a) described two new silurid genera and species, *Hito taytayensis* and *Penesilurus palawanensis*, from Palawan in the Philippines. This was the first record of any member of the family in the Philippines; the only other Philippine fresh-water catfishes are two species of the family Clariidae.

No figures were given, but from the descriptions of these new forms it appears that they differ only in the following points :

<i>Hito taytayensis</i>	<i>Penesilurus palawanensis</i>
One pair of mandibular barbels	Two pairs of mandibular barbels
Dorsal 3 or 4	Dorsal 2
Anal 57-61	Anal 55
Ventral 7	Ventral 6
Branchiostegals 12-14	Branchiostegals 10

Herre's original specimens of *Hito* were collected in northern Palawan ; collections made later yielded specimens from Culion in 1931 and from Busuanga in 1940, both islands being in the Calamianes group north of Palawan and faunally practically identical with it. Herre (1934, p. 22) reported on those in the 1931 collection. On examination of a fine series of 63 specimens from the two latter localities, I discovered that the generic limits set by Herre must be somewhat modified. The fin counts should be : D. 3-4 ; V 7-8 ; P. I, 11-I, 13 ; A. 57-68. Herre gave the Philippine genera the character, unique among Siluridae, of having a small patch of teeth on each palatine. I found in the course of this study that among my Philippine specimens, only about half possessed this character, and some of this half had the teeth on one palatine only. Thus the character has not much generic value, except to indicate a tendency which is lacking in other members of the family.

Penesilurus was described from a single specimen, stated to be in poor condition. Except for a slight difference in ray counts, which can hardly be considered as having generic value, especially since some of the fins were damaged, the only difference seems to be the extra pair of mandibular barbels. As stated before, an extra pair of mandibular barbels cannot be considered as of generic, and often not of specific value in this group. Among the specimens in the series of *Hito* I examined were two that were perfectly typical except for the possession of an extra pair of mandibular barbels. All facts taken together, it seems that this is a phenomenon that probably occurs not too rarely in *Hito*, and that the type of *Penesilurus palawanensis* is nothing but a six-barbelled, badly preserved example of *Hito taytayensis*.

Herre (1924b) published descriptions of these two genera, identical with the others except that *Hito* was designated as *Hitoichthys taytayensis*. Since it cannot be determined which of the two papers has priority, I arbitrarily designate *Hito* as the generic name, reducing *Hitoichthys* to synonymy.

The range of *taytayensis* is apparently a very restricted one. Herre (1924), in a discussion of the strictly fresh water fishes of the Philippines attributed this to the fact that it occurs in a little-inhabited region and is small and unimportant as food, and thus has never been distributed by man ; also, the geographical character of Palawan and the Calamianes has prevented natural dispersal.

These forms were derived from the fauna of Borneo and Sumatra, to which they appear to be most closely related, and with which the fauna of Palawan and the Calamianes is largely identical.

Pellegrin and Chevey (1937, p. 315) described a new *Penesilurus* from Bokor, Cambodia, *P. bokorensis*. Aside from the fact that the occurrence of two isolated populations of a genus, one in the Philippines and the other in Indo-China, seems doubtful, this fish from the description certainly cannot be either a *Penesilurus* or a *Hito*, but is apparently merely a six-barbelled specimen of *Silurus cochinchinensis* Cuvier and Valenciennes. This is but another example of the remarkable amount of confusion centered around this common, protean, and apparently wide-ranging species.

8. Genus *Ompok* Lacépède.

Body strongly compressed, head depressed. Mouth sharply oblique; gape not surpassing anterior border of eye; lower jaw prominent. Anterior nostrils tubular, wideset. Posterior nostrils valved, before anterior border of eye. Eyes subcutaneous, their ventral border set on a level with corner of mouth or lower, often visible from underside of head. Maxillary barbels varying in length. Mandibular barbels two in number, in length from shorter than eye to surpassing caudal. Teeth in jaws short, in broad bands. Vomerine teeth in one or two patches, varying size. No teeth on palatines. Gillrakers rather short, curved, wideset about 7-10 on long limb of gill arch. Anal free from caudal or narrowly connected with it. Caudal forked. Pectoral spine smooth or denticulate on inner margin.

D. 3-4; P. I, 9-I, 14; V. 6-10; A. 47-82; B. 9-14.

The confusion surrounding the history and nomenclature of the genus *Ompok* has been considerable. Hora (1936a, p. 356 *et. seq.*) gave a detailed discussion of the problem. Briefly, the main points may be summarized as follows:

In 1797, Bloch (p. 17) described a new species of catfish, *Silurus bimaculatus*, from the Malabar coast of India. Lacépède described a new genus and species, *Ompok siluroides*, in 1803 (p. 49). The description was made from a dried specimen, and was inaccurate, as was the plate accompanying it. In 1822 (p. 150) Hamilton erected the subgenus *Callichrous* without diagnosis, under which he described seven new species of Indian catfishes (as *Silurus*, the sub-generic name not being mentioned again). One of these species was later placed in the synonymy of *Wallago attu*, while another was put in a different family.

Swainson (1839, p. 306) recognized *Callichrous* as a distinct genus (spelling it *Callichrus*) and gave a diagnosis¹ which, however, might apply equally well to almost any of the silurid genera. He referred to *Callichrous* Hamilton's several species, and also *Silurus bimaculatus* Bloch.

¹"Head large, depressed; mouth large, not vertical; dorsal fin close to the head; anal fin excessively long; vent close to the pectoral; caudal fin forked."

In the same year, Cuvier and Valenciennes (1839, p.362) placed *Ompok siluroides* in the synonymy of *Silurus bimaculatus* Bloch. Valenciennes had re-examined the badly preserved type of *Ompok siluroides* and rectified the errors in the original description. Although the specimen was in such poor condition that not much information could be obtained from it, enough could be seen to convince the authors that the fish was identical with *Silurus bimaculatus* Bloch. They concluded that since the original diagnosis was erroneous, the generic name *Ompok* was invalid.

Bleeker (1858, p. 275) erected the new genus *Pseudosilurus*, in which *Silurus bimaculatus* and *Callichrous bimaculatus* were included. Later (1862, p. 395) he returned to the name *Callichrous*, making *Pseudosilurus* a synonym of it (the former name having priority), gave a thorough diagnosis of the genus, and named *Callichrous pabda* as the genotype. In his *Atlas* (1862a, p. 85) he upheld the position of Cuvier and Valenciennes in stating that the name *Ompok* was invalid, although older than both *Callichrous* and *Pseudosilurus*; he remarked that the genus *Ompok* was erected on an erroneous assumption (Lacépède had believed that the dorsal fin was lacking) and the name was a mutilation of the native name "Limpok."

Day (1878-88, p. 475, and 1889, p. 129) included *Ompok kryptopterus*, *Kryptopterichthys*, *Micronema*, *Phalacronotus*, *Hemisilurus*, *Silurodes*, *Pseudosilurus*, *Silurichthys*, and *Pterocryptis* all in the synonymy of *Callichrous*.

Weber and Beaufort (1913), in their review of the silurid genera, again returned to generic rank *Kryptopterus*, *Hemisilurus*, *Silurodes*, and *Silurichthys*; *Pseudosilurus* and *Ompok* remained in the synonymy of *Callichrous*.

Most ichthyologists have followed Bleeker's lead in discarding the name *Ompok* in favour of *Callichrous*. Hora (1936a, p. 358) agreed with this view. However, as Smith (1945, p. 337) pointed out, "the fact that a genus is inadequately or even incorrectly described does not affect the validity of the proposed name if it otherwise conforms to the requirements of zoological nomenclature." Since the type of *Ompok siluroides* was re-examined, the errors in the original description corrected, and the form definitely included in the synonymy of *Silurus bimaculatus*, which in turn is assigned to *Callichrous*, there seems to be no reason why the older name *Ompok* should not be used instead of *Callichrous*.

The status of the several forms of *Ompok* is somewhat questionable. In the past a number of species have been named, most of them admittedly closely related to one another. The status of the Indian species was discussed by Hora (1936a, p. 358 *et seq.*). He concluded that of the many forms described from that area, two can be recognized, *Ompok pabo* (Hamilton) and *Ompok bimaculatus* (Bloch), most of the other described forms falling into the synonymy of the latter species.

Ompok bimaculatus ranges all the way through Java, Borneo, Sumatra, Malaya, Siam, Indo-China, India, Burma, and Ceylon, and within this range there is considerable intraspecific variation. The anal rays for *O. bimaculatus* and its synonyms have been reported as ranging all the way between 47 and 75, and great colour, proportional, and other variations occur.

Three common forms are generally recognized: the wide-ranging *O. bimaculatus* (Bloch), with anal and dorsal fins separate and maxillary barbels longer than the head; *O. pabo* (Hamilton), restricted to north-east India and Burma, with anal and dorsal separate and maxillary barbels shorter than the head; and *O. leiacanthus* (Bleeker), from Sumatra, Banka, Borneo, and Singapore, with long mandibular barbels and anal connected with the base of the caudal.

In view of the great individual variation and wide geographical distribution in *Ompok bimaculatus*, it would seem that one should be able to discover a correlation between geographical location and these variations. Hora (1936a), did not include in his discussion any tabulation of anal ray counts and other characters of his specimens according to locality, and he failed to consider any members of the species outside of India. It seems entirely possible that if statistical studies based on large numbers of specimens were made, enough correlations would appear to warrant resurrection of some of the names from the synonymy in which Hora placed them, and the returning of these names to specific or at least subspecific status.

With 53 specimens of *O. bimaculatus* at hand, I made proportionally measurements and set them up in table form, attempting to see how much variation and correlation actually existed. While the sample was too small and the range too narrow for any conclusive results, the data I obtained at least indicates that further studies should be made before the status of *Ompok bimaculatus* and its numerous synonyms can be definitely established. (See accompanying tables.)

A few other described forms not mentioned in Hora's paper should be noted. *Wallago krattensis*, described by Fowler (1934a, p. 335) from Siam, seems to be definitely an *Ompok*, judging from the description and figure, and not unlike a normal *O. bimaculatus*, except for a rather deeper body. Smith (1945) overlooked this form in his review of the Siamese fishes; he did not include it either as a species or in synonymy. Without more specimens and further knowledge concerning it, I should not regard it as distinct from the *Ompok bimaculatus* complex.

Callichrous weberi was described by Hardenberg (1936, p. 232) from Borneo. No figure was given; from the description it appears to differ from other described forms only in the pectoral fins being I, 9 instead of I, 10-I, 14, and 6 rays in the ventral fins instead of 7-10.

TABLE II.

Comparative measurements of specimens of Ompok bimaculatus from India. The proportional measurements are given in per cent.

				BOMBAY.	VIZAGAP- ATAM.	CENTRAL PROVINCES.			CALCUTTA.				
				41885	41886	41887	41887	41887	34864	34864	34864	34864	34864
Stanford Cat no. . .	..	..	..	198	103	126	101.5	90	140	135	132	128	112
Standard length ..	..	..	..	19.1	19.4	19.0	18.2	17.7	17.8	18.8	20.3	20.3	18.3
Head-st. 1. . .	..	..	..	34.7	40.0	38.4	40.0	43.7	52.0	47.8	33.3	34.4	52.6
Eye-interorb. sp...	..	..	..	21.0	20.0	20.8	21.6	21.8	26.0	21.5	18.1	19.2	24.3
Eye-head ..	..	..	..	31.5	40.0	37.5	32.4	31.2	32.0	35.2	36.3	32.6	39.0
Gape-head ..	..	..	..	30.0	30.5	29.7	29.5	27.7	30.0	31.8	34.4	31.2	29.4
D. to snout-st. 1...	..	..	..	8.0	7.7	6.3	5.9	6.6	5.7	6.6	7.3	6.2	6.8
Ventral-st. 1. . .	..	..	..	18.1	18.4	19.8	17.7	20.0	20.0	20.0	16.6	21.0	17.8
Pectoral-st. 1. . .	..	..	..	6.5	6.7	5.5	5.4	5.5	6.4	5.9	5.3	6.2	5.3
P. base-st. 1. . .	..	..	..	21.7	16.5	21.0	18.7	21.1	17.8	20.7	14.7	23.0	20.5
Caudal-st. 1. . .	..	..	..	60.6	62.1	65.0	64.5	62.2	60.0	63.7	58.7	61.3	66.5
Base anal-st. 1. . .	..	..	..	22.7	23.8	24.2	20.6	20.0	22.1	.7	23.4	26.5	23.2
Depth-st. 1. . .	..	..	..	41.4	37.8	44.4	48.7	54.4	46.0	50.8	9.3	52.3	50.0
Max. barbels-st. 1.	..	..	..	4	4	4	4	4	4	4	4	4	4
Dorsal rays ..	..	..	..	64	53	64	64	61	69	2	55	61	67
Anal rays ..	..	..	..	I, 13	I, 12	I, 13	I, 13	I, 13	I, 14	, 13	I, 13	I, 13	I, 13
Pectoral rays ..	..	..	..	8	8	8	8	8	8	8	8	7	8
Pelvic rays ..	..	..	..	11	12	12	12	11	11	11	12	11	11
Branchiostegals ..	..	..	..							

TABLE II—*contd.*

Comparative measurements of specimens of Ompok bimaculatus from India. The proportional measurements are given in per cent.—contd.

					CALCUTTA.										
Stanford Cat. no.	..	..	..	..	34864	34864	34864	34864	34864	34864	34864	34864	34864	34864	34865
Standard length	..	..	..	..	109	109	98.5	97.5	97	95	92.5	89	88	82	115
Head-st. 1.	..	..	..	..	17.8	18.8	20.8	18.4	19.0	18.9	20.5	20.7	21.0	20.7	22.6
Eye-interorb. sp.	..	..	..	..	40.0	55.5	42.1	56.2	44.4	44.4	43.7	50.0	43.7	46.6	34.6
Eye-head	..	..	..	..	20.5	24.3	19.5	25.0	21.6	22.2	18.4	24.3	18.9	20.5	17.3
Gape-head	..	..	..	..	41.4	41.4	36.5	33.3	32.4	38.8	34.2	35.1	35.1	35.2	42.3
D. to snout-st. 1.	..	..	..	..	28.8	29.8	29.4	28.2	29.8	30.0	32.4	30.8	33.5	31.0	33.9
Ventral-st. 1.	..	..	..	..	6.4	7.7	5.0	5.6	5.6	8.4	7.5	7.8	8.5	6.0	7.8
Pectoral-st. 1.	..	..	..	..	20.6	19.7	20.3	19.4	19.5	20.0	17.2	17.9	18.1	18.2	19.1
P. base-st. 1.	..	..	..	..	5.5	5.0	6.5	5.1	4.1	5.2	4.8	6.1	5.6	4.8	7.8
Caudal-st. 1.	..	..	..	..	21.1	19.7	21.3	19.4	18.5	21.5	15.6	17.4	17.6	17.0	14.7
Base anal-st. 1.	..	..	..	..	65.5	66.5	62.9	67.1	69.5	66.3	64.8	58.4	61.3	62.1	61.7
Depth-st. 1.	..	..	..	..	21.1	21.1	19.2	20.5	20.6	21.0	21.6	22.4	17.6	21.9	22.6
Max. barbels-st. 1.	..	..	..	..	52.2	55.0	64.4	58.4	57.7	60.0	38.9	38.2	29.5	34.1	38.2
Dorsal rays	..	..	..	..	4	4	5	4	4	4	4	4	4	4	4
Anal rays	..	..	..	..	63	63	69	64	68	63	56	57	57	56	56
Pectoral rays	..	..	..	..	I, 13	I, 14	I, 14	I, 13	I, 12	I, 13	I, 11	I, 11	I, 11	I, 13	I, 13
Pelvic rays	..	..	..	..	8	8	8	8	8	8	8	8	8	8	8
Branchiostegals	..	..	..	..	11	11	11	11	11	11	11	12	12	12	11

TABLE III.

Comparative measurements of specimens of Ompok bimaculatus from Rangoon, Burma. The proportional measurements are given in per cent.

Stanford Cat no.	..	..	..	..	33790	33790	33790	33790	33790	33790	33790	33790	33790	33790	33796
Standard length	..	..	..	..	133	133	130	115	110	106	99·5	97	85	83	198
Head st. 1.	..	..	..	..	18·0	20·3	17·6	17·8	21·3	19·8	18·0	18·5	17·6	18·0	22·2
Eye-interorb. sp.	..	..	..	..	35·7	35·7	40·7	50·0	30·7	34·7	44·4	44·4	43·7	53·3	35·7
Eye-head	..	..	..	..	20·8	18·5	23·9	24·3	17·0	19·0	22·2	22·2	23·3	26·6	22·7
Gape-head	..	..	..	..	43·4	44·4	39·1	43·9	46·8	42·8	41·6	36·1	36·6	40·0	52·2
D. to snout-st. 1.	..	..	..	..	27·8	35·4	30·0	30·0	33·6	33·4	26·6	29·8	28·2	28·9	36·8
Ventral-st. 1.	..	..	..	..	7·5	9·0	5·3	—	8·1	6·6	5·5	5·6	5·8	4·8	8·5
Pectoral-st. 1.	..	..	..	..	18·7	20·3	—	—	20·0	—	19·0	18·5	17·6	19·2	—
P. base-st. 1.	..	..	..	..	6·0	6·0	6·1	4·5	5·4	5·6	6·5	5·6	6·4	4·8	7·0
Caudal-st. 1.	..	..	..	..	18·0	17·2	—	—	—	—	—	20·1	20·0	18·6	—
Base anal-st. 1.	..	..	..	..	69·1	63·1	69·6	66·9	60·9	63·2	70·3	67·0	67·0	68·0	59·5
Depth-st. 1.	..	..	..	..	19·5	24·0	20·7	21·7	24·5	22·6	19·0	20·6	20·5	19·2	24·7
Max. barbels-st. 1.	..	..	..	..	49·6	60·1	57·6	54·7	38·6	39·6	60·3	53·6	52·9	53·0	41·9
Dorsal rays	..	..	..	..	4	4	4	4		4	4	4	4	4	4
Anal rays	..	..	..	..	67	59	66	68	60	58	68	69	68	65	52
Pectoral rays	..	..	..	..	I, 13	I, 13	I, 14	I, 13	I, 13	I, 18	I, 13	I, 11	I, 13	I, 14	I, 13
Pelvic rays	..	..	..	..	8	8	8	8	8	8	8	8	8	8	8
Branchiostegals	..	..	..	..	11	12	12	11	12	12	11	11	11	12	11

TABLE IV.

Comparative measurements of specimens of Ompok bimaculatus from Ceylon. The proportional measurements are given in per cent.

					COLOMBO					PERA-DENIYA	GALATA-BENDIYAVA	
Stanford Cat. no.	..	..	..	..	22913	22913	22913	30177	30177	30177	30178	30179
Standard length	..	..	..	..	128	124	123.5	187	115	98	102	51
Head-st. 1.	..	..	..	..	17.9	18.5	19.4	19.7	20.0	21.4	20.5	19.6
Eye-interorb. ap.	..	..	..	..	33.3	30.4	29.1	30.4	27.2	31.8	32.7	33.3
Eye-head	..	..	..	..	17.3	15.2	14.5	18.9	13.0	16.6	19.0	20.0
Gape-head	..	..	..	..	32.6	30.4	35.4	40.5	34.7	33.3	38.0	40.0
D. to snout-st. 1.	..	..	..	..	32.4	31.0	31.1	34.2	32.1	30.6	33.8	35.2
Ventral-st. 1.	..	..	..	..	7.4	6.4	7.2	6.9	6.5	6.6	6.8	6.8
Pectoral-st. 1.	..	..	..	..	16.7	15.3	17.0	16.0	15.2	17.3	17.6	17.6
P. base-st. 1.	..	..	..	..	4.6	5.6	5.2	5.3	5.6	6.1	5.8	5.8
Caudal-st. 1.	..	..	..	..	15.6	17.3	17.0	18.1	17.3	22.4	15.6	—
Base anal-st. 1.	..	..	..	..	65.2	64.1	62.3	60.6	61.7	60.2	60.7	64.7
Depth-st. 1.	..	..	..	..	21.8	22.9	25.9	24.0	25.2	21.9	23.5	21.5
Max. barbels-st. 1.	..	..	..	..	31.2	34.6	37.2	38.7	38.2	46.2	43.1	39.2
Dorsal rays	..	..	..	..	4	4	4	4	4	4	4	4
Anal rays	..	..	..	..	57	61	60	62	63	63	66	68
Pectoral rays	..	..	..	..	I, 13	I, 14	I, 13	I, 14	I, 12	I, 14	I, 14	I, 14
Pelvic rays	..	..	..	..	8	8	8	8	8	8	8	13
Branchiostegals	..	..	..	..	12	12	11	11	12	12	12	12

TABLE V.

Comparative measurements of specimens of *Ompok bimaculatus* from Malaya and Siam. The proportional measurements are given in per cent.

					MALAYA			SIAM			
					SINGAPORE		PERAK	PAHANG		S. E. SIAM	SINGORA
Cat. no.					31070	31070	32735	32799	32899	28824	31069
Standard length	..	..	..	..	147	129	147	891	163	175	147
Head-st. 1.	..	..	..	..	20.7	20.5	20.0	20.9	19.6	21.7	20.4
Eye-interobr. sp.	..	..	..	..	28.5	26.6	30.3	27.2	27.5	31.5	29.4
Eye-head	..	..	..	..	16.3	15.0	16.9	15.0	17.1	15.7	16.6
Gape-head	..	..	..	..	49.1	37.7	47.4	38.7	45.3	44.7	43.3
D to snout-st. 1.	..	..	..	..	32.6	31.7	32.6	34.0	33.7	34.8	32.6
Ventral-st. 1.	..	..	..	..	9.5	7.7	7.4	8.3	9.2	8.0	8.1
Pectoral-st. 1.	..	..	..	..	18.3	17.8	17.6	15.7	17.1	19.4	17.6
P. base-st. 1.	..	..	..	..	6.1	6.5	6.1	5.7	6.4	6.2	6.1
Caudal-st. 1.	..	..	..	..	17	17.0	14.9	15.9	—	17.1	14.6
Base anal-st. 1.	..	..	..	..	66.6	60.4	55.7	54.7	58.2	56.2	59.1
Depth-st. 1.	..	..	..	..	24.4	25.5	20.4	21.4	25.1	23.1	22.4
Max. barbels-st. 1.	..	..	..	..	42.8	41.0	46.9	26.1	28.2	33.1	42.8
Dorsal rays	..	..	..	..	4	4	4	4		4	4
Anal rays	..	..	..	..	56	54	56	60	56	58	57
Pectoral rays	..	..	..	..	I, 13	I, 12	I, 13	I, 13	I, 13	I, 13	I, 13
Pelvic rays	..	..	..	..	8	8	8	8	8	8	8
Branchiostegals	..	..	..	..	10	12	12	13	13	12	11

TABLE VI.

Comparative measurements of specimens of Ompok bimaculatus from Java. The proportional measurements are given in per cent.

	BUITENZORG		BATAVIA			
	20496	20496	U. Mich.	U. Mich.	U. Mich.	U. Mich.
Standard Cat. no.						
Standard length	177	158	150	140	127.5	109
Head-st. 1.	20.3	20.2	21.3	21.4	21.1	20.6
Eye-interorb. sp.	28.5	30.5	32.2	32.2	35.7	33.2
Eye-head	16.6	17.1	15.6	16.6	18.5	15.5
Gape-head	44.4	43.7	34.3	31.6	38.8	37.7
D. to snout-st. 1.	34.1	34.6	32.6	33.2	36.8	28.4
Ventral-st. 1.	9.0	8.5	8.0	9.2	8.6	8.2
Pectoral-st. 1.	18.6	16.4	18.6	20.7	20.0	19.2
P. base-st. 1.	6.2	6.3	6.0	5.7	7.0	5.5
Caudal-st. 1... .. .	17.5	15.5	15.3	17.1	18.8	—
Base anal-st. 1.	55.3	62.9	64.0	58.5	58.0	62.3
Depth-st. 1.	23.7	23.4	24.6	25.0	27.4	22.0
Max. barbels-st. 1.	37.5	30.3	46.6	48.5	36.8	57.7
Dorsal rays	5	4	4	4	4	4
Anal rays	62	61	63	63	55	59
Pectoral rays	I, 14	I, 12	I, 13	I, 13	I, 14	I, 12
17 Pelvic rays	8	8	8	8	8	8
Branchiostegals	13	11	11	11	12	11

Ompok nebulosus (Vaillant), listed by Fowler (1905, p. 465), is certainly referable to the genus *Wallago*, where it was originally placed by Vaillant. Weber and Beaufort (1913) synonymized it with *Wallago miosstoma*.

Ompok jaynei Fowler (1905, p. 466) was placed doubtfully by Weber and Beaufort (1913) in the synonymy of *O. leiacanthus*. It does not appear to differ from the latter species except in colouration, which is a character of doubtful value.

Hardenberg (1938, p. 311) described a new species, *Belodontichthys javanensis*, from Java. No figure was given, but from the description the fish cannot belong to the genus *Belodontichthys* as now defined. The head was described as depressed, and the pectorals are given as the length of the head without half the snout, instead of being unusually long. No mention was made of the other significant characters such as the length of the pectoral bases, the shape of the teeth, or the number and form of the gillrakers. Lacking this information it is difficult to say with certainty, but judging from the depressed head and relatively short pectoral, the fish seems to fit better into the genus *Ompok*. From what description was given it might also conceivably belong to the genus *Wallago*, although key characters such as the presence or absence of an orbital rim were not given. For the present, the status of this fish must remain uncertain.

Silurodes has been considered a distinct genus by most authors. Bleeker erected the genus in his catfish revision of 1858 (p. 271), including in it *Silurus hypophthalmus* Bleeker and *Silurus macronema* Bleeker. Later (1862, p. 394) he placed *Callichrous*, *Ompok*, and *Pseudosilurus* in synonymy with *Silurodes*, but in his *Atlas* of the same year (1862a, p. 83) he resurrected *Callichrous*, which was distinguished from *Silurodes* mainly by the occurrence in the latter genus of the vomerine teeth in one patch and the eyes lower-set. Günther (*loc. cit.*, pp. 48-49) placed *S. hypophthalmus* and *S. macronema* with *Callichrous*. Weber and Beaufort (1913, p. 205) resurrected the genus *Silurodes*, and made *S. macronema* a synonym of *S. hypophthalmus*.

Besides *Silurodes hypophthalmus* (Bleeker), two other forms are generally referred to this genus. *Callichrous eugeneiatus* Vaillant (1893, p. 61) was placed in *Silurodes* by Weber and Beaufort, as was *Callichrous borneensis* Steindachner (1901, p. 445).

Weber and Beaufort distinguished *Silurodes* from *Callichrous* only by the occurrence of the vomerine teeth in one patch, and the shorter mouth and lower-set eyes. Hora (1941, pp. 17-18) showed that there is intraspecific variation in *S. hypophthalmus* in regard to the vomerine teeth, which is not surprising considering that instances of this type of variation are known throughout the family. Hora had previously remarked (1936a, p. 357) that he did not consider this character to be of sufficient generic value. I have been unable to find any other differences between the two genera which would warrant their remaining separated, and I here include the three species normally referred to *Silurodes* under the genus *Ompok*.

9. Genus **Kryptopterus** Bleeker.

Body strongly compressed, head depressed. Mouth straight to oblique gape very short, not reaching anterior border of eye. Jaws equal, or one

jaw or the other slightly longer. Anterior nostrils tubular, wideset; posterior nostrils before anterior border of the eye or slightly behind vertical from its front border. Eyes subcutaneous, opposite the corner of the mouth and visible from underside of head, usually quite large, $2\frac{1}{2}$ -6 in head. Maxillary barbels very slender, varying in length. Mandibular barbels short, rudimentary, or absent. Teeth in jaws short, forming broad bands. Vomerine teeth usually in one patch, more rarely two. No teeth on palatines. Gillrakers long, curved and slender, usually as long as the branchial filaments, about 15-20 on the long limb of the gill arch. Anal free from caudal or narrowly joined to it. Caudal deeply forked. Dorsal rays, when present, short, about two in eye; dorsal sometimes lacking.

D. 0-2; P. I, 10-I, 17; V. 5-10; A. 48-93; B. 8-17.

Most of the species now carried in *Kryptopterus* were first described by Bleeker under the name *Silurus*. In his 1858 revision of the catfishes, Bleeker assigned these species to five new genera, *Kryptopterus*, *Kryptopterichthys*, *Micronema*, *Palacronotus*, and *Hemisilurus*. These genera were distinguished from one another chiefly on the basis of the degeneration of the dorsal fin and the number of mandibular barbels as follows: -

Kryptopterus: Rudimentary dorsal, vomerine teeth in one patch, branchiostegals 10-12, 2 pairs of barbels.

Kryptopterichthys: Rudimentary dorsal, vomerine teeth in one patch, branchiostegals, 8-9, 1 pair of barbels.

Micronema: No dorsal, vomerine teeth in one patch, branchiostegals 12-14, 2 pairs of barbels.

Palacronotus: No dorsal, vomerine teeth in one patch, branchiostegals 14-17, 1 pair of barbels.

Hemisilurus: No dorsal, vomerine teeth in two patches, branchiostegals 9-13, 1 pair of barbels.

Günther (*op. cit.*) lumped all these forms into *Cryptopterus*. Weber and Beaufort (1913) returned *Hemisilurus* to generic rank, but left *H. schilbeides* with *Cryptopterus*. The generic name was again spelled *Kryptopterus* in various publications of Fowler and Smith.

Representatives of the genus *Kryptopterus* are known only from the Malay Peninsula, Siam, Sumatra, Java, Borneo, and Indo-China, but within this relatively restricted range there are probably more species than occur in any other silurid genus. Although the genus itself is well defined, there is considerable confusion surrounding the species. About fifteen forms are recognized at the present time, some of which are probably invalid, while others are doubtless as yet undescribed. The genus is in need of a thorough revision, but due to lack of sufficient material no such attempt could be made here.

Probably most of the difficulty in distinguishing the species as they now stand is due to the fact that separations have been largely artificial. These fishes have very few external characters by which they may be differentiated; they are keyed out chiefly on the basis of presence or absence of a dorsal fin, length of barbels, distribution of vomerine teeth

and general body proportions. It has been demonstrated that throughout the family Siluridae considerable intraspecific variation may occur in regard to such characters, and it is likely that species of *Kryptopterus* have been badly confused through too-great dependence on them, as well as through paucity of material of many of the described forms. I found great difficulty in keying out specimens in the Stanford collections, because they did not conform with the published descriptions.

It was found necessary to use the number of rays in the dorsal fin as a key character for separating *Kryptopterus* from the other genera, although not as a prime classificatory character as had been the case with some previously written keys to the silurid genera. The result is likely to be unnatural divisions when such a character as the number of rays of the dorsal fin, in a series of species which show a progressive, and perhaps heterophyletic, degeneration of that fin, is used as a primary basis of classification. It seems useful, however, to make some use of this character at present, albeit with full knowledge of its possibly small phylogenetic importance.

I found an unnamed specimen from Singora, Siam, which I identified as *Kryptopterus macrocephalus* (Bleeker). The length of the specimen, with caudal, is 73 mm. It agrees with the description of Weber and Beaufort (1913, p. 217) except that the vomerine teeth are in two rounded, slightly separated patches instead of in a single patch, and the anal rays are 48 rather than 52. Other specimens of *K. macrocephalus* in the fish collections of the Stanford Natural History Museum also have the vomerine teeth in two patches; apparently there is considerable intraspecific variation in this respect. The species has previously been recorded only from Sumatra, Borneo, and the Malay Peninsula (Perak and Johore). With this specimen the range is extended to peninsular Siam.

A CHECK-LIST OF THE GENERA AND SPECIES OF THE FAMILY SILURIDAE.

The species here listed are for the most part currently recognized; there is some doubt as to whether all of them are valid. Included after the synonymy of each species is a list of specimens examined in the course of this study. Unless otherwise stated, the numbers following these specimens are catalogue (register) numbers of the fish collections in the Natural History Museum of Stanford University.

1. Genus *Hemisilurus*, Bleeker.

- 1858. *Hemisilurus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 295 (type; *Wallago heterorhynchus* Bleeker; 1853a; p. 514; by subsequent designation of Bleeker; 1862; p. 395).
- 1891. *Diastatomycter*, Vaillant, *Bull. de la Soc. Philomathiq. d. Paris* (8) III; p. 182 (type by monotype; *Diastatomycter chaperi* Vaillant; 1891; p. 182).

Hemisilurus chaperi (Vaillant).

- 1891. *Diastatomycter chaperi*, Vaillant, *Bull. de la Soc. Philomathiq. d. Paris* (8) III; p. 182 (type-locality; Borneo).
- 1893. *Diastatomycter chaperi*, Vaillant, *Bull. de la Soc. Zoologiq. d. France* XVIII; p. 61.

1913. *Hemisilurus chaperi*, Weber & Beaufort, *Fish; Indo-Austral. Archipel.* II; p. 211.

Range.—Borneo.

***Hemisilurus heterorhynchus* (Bleeker).**

- 1853a. *Wallago heterorhynchus*, Bleeker, *Nat. Tijds. Ned. Ind.* V; p. 514 (type-locality; Sumatra).
 1858. *Hemisilurus heterorhynchus*, Bleeker, *Ichthyol. Archipel. Inst.* I; p. 296.
 1862a. *Hemisilurus heterorhynchus*, Bleeker, *Atal. Ichthyol.* II; p. 94. pl. lxliii; fig. 2.
 1864. *Hemisilurus heterorhynchus*, Günther, *Cat. Fish. Brit. Mus.* V; p. 54.
 1913. *Hemisilurus heterorhynchus*, Weber & Beaufort, *Fish, Indo-Austral. Archipel.* II; p. 211.

Range.—Sumatra and Borneo.

***Hemisilurus moolenburghi*, Weber & Beaufort.**

1913. *Hemisilurus moolenburghi*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II; p. 212; figs. 84-85 (type-locality; Sumatra).
 1936. *Hemisilurus moolenburghi*, Hardenberg, *Treubia* XV; p. 232.

Range.—Sumatra and Borneo.

2. Genus *Ceratoglanis*, Myers.

1938. *Ceratoglanis*, Myres, *Copeia*, No. 2, p. 98 (type by original designation *Hemisilurus scleronema* Bleeker, 1861a, p. 93).

***Ceratoglanis scleronema* (Bleeker).**

- 1862a. *Hemisilurus scleronema*, Bleeker, *Atl. Ichthyol.* II; p. 93; pl. ci (type-locality; Java).
 1862b. *Hemisilurus scleronema*, Bleeker, *Versl. Akad. Amsterdam* XV; p. 74 (described as new; but the description in 1862a evidently published first).
 1913. *Hemisilurus scleronema*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 214, fig. 86.
 1938. *Ceratoglanis scleronema*, Myers, *Copeia*, No. 2, p. 98.
 1945. *Ceratoglanis scleronema*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 339.

Range.—Java, Borneo, Sumatra, and Siam.

Specimens examined.—Mandan R., Siak, Sumatra, one example. U. S. National Museum 93287.

3. Genus *Belodontichthys*, Bleeker.

1858. *Belodontichthys*, Bleeker, *Ichthyol. Archipel. Ind.* I; p. 266 (type, *Wallago dinema* Bleeker; 1851b; pp. 198; 202; equals *Belodontichthys macrochir* Bleeker; 1858; p. 266; by subsequent designation of Bleeker; 1862; p. 394).

***Belodontichthys dinema* (Bleeker).**

- 1851b. *Wallago dinema*, Bleeker, *Nat. Tijds. Ned. Ind.* II; pp. 198; 202 (type-locality; Borneo).
 1858. *Belodontichthys macrochir*, Bleeker, *Ichthyol. Archipel. Ind.* I; p. 266 (equals *Wallago dinema* Bleeker; 1851b; pp. 198, 202).
 1862. *Belodontichthys macrochir*, Bleeker, *Versl. Akad. Amsterdam* XIV; p. 394.

- 1862a. *Belodontichthys macrochir*, Bleeker, *Atl. Ichthyol.* II; p. 80; pl. lxxxvi; fig. 2;
 1913. *Belodontichthys dinema*, Weber & Beaufort, *Fish, Indo-Austral. Archipel.* II; p. 204; fig. 79.
 1938. *Wallago dinema*, Myers, *Copeia*; No. 2; p. 98.
 1945. *Wallago dinema*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 335.

Range.—Borneo, Sumatra, Malay Peninsula, and Siam.

Specimens examined.—Palembang, Sumatra, two examples. University of Michigan (uncatalogued) Bang Sai, Siam, one example. U. S. National Museum 103314.

4. Genus *Silurichthys*, Bleeker.

1858. *Silurichthys* Bleeker, *Ichthyol. Archipel. Ind.* I; p. 269 (type; *Silurus phaiosoma* Bleeker, 1851c; p. 428, by subsequent designation of Bleeker; 1862; p. 394).

Silurichthys hasseltii, Bleeker.

1858. *Silurichthys hasseltii*, Bleeker, *Ichthyol. Archipel. Ind.* I; p. 270 (type-locality; Java).
 1862a. *Silurichthys hasseltii*, Bleeker, *Atl. Ichthyol.* II; p. 82; pl. lxxxvii; fig. 1.
 1904. ?*Silurichthys indragiriensis*, Volz, *Annal. Soc. Zoologiq. Suisse* XII, p. 264 (type-locality, Sumatra).
 1913. *Silurichthys hasseltii*, Weber & Beaufort, *Fish, Indo-Austral. Archipel.* II; p. 198.
 1913. ?*Silurichthys indragirensis*, Weber & Beaufort, *ibid.*, II; p. 199.

Range.—Java, Borneo, Sumatra, and Malay Peninsula (?)

Specimens examined.—

Singapore; Straits Settlements; British Malaya; one example.	31075
Mandai Rd.; Singapore; Straits Settlements; British Malaya; twenty-nine examples.	32701.
Jurong; Singapore; Straits Settlements; British Malaya; three examples.	32700.
Gunong Pulai; Johore State; British Malaya; one example.	32697.
" " " " " " four examples.	31078.
Kota Tinggi, " " " " " " one example.	32698.
" " " " " " one example.	39335.
" " " " " " two examples.	32699.

Silurichthys leucopodus, Fowler.

1939. *Silurichthys leucopodus*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia* LXLI; p. 56; figs. 4-6 (type-locality; Trang, Siam).

Range.—Siam.

Silurichthys phaiosoma (Bleeker).

- 1851c. *Silurus phaiosoma*, Bleeker, *Nat. Tijds. Ned. Ind.* II; p. 428 (type-locality; Borneo).
 1858. *Silurichthys phaiosoma*, Bleeker, *Ichthyol. Archipel. Ind.* I; p. 269.
 1862a. *Silurichthys phaiosoma*, Bleeker, *Atl. Ichthyol.* II; p. 81; pl. lxxxvii; fig. 2.
 1913. *Silurichthys phaiosoma*, Weber & Beaufort, *Fish, Indo-Austral. Archipel.* II, p. 197, fig. 77.
 1945. *Silurichthys phaiosoma*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 334.

Range.—Borneo, Sumatra, Malay Peninsula, and Siam (?)

Specimens examined.—Telok Anson, Perak State, British Malaya, one example. 31076.

***Silurichthys schneideri* Volz.**

1904. *Silurichthys schneideri*, Volz. *Annal. Soc. Zoologiq. Suisse* XII, p. 263 (type-locality; Sumatra).
 1913. *Silurichthys schneideri*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II; p. 198.
 1941. *Silurichthys schneideri*, Hora & Gupta, *Bull. Raffles Mus., Singapore.* No. 17, p. 166, pl. ii, fig. 1.

Range.—Sumatra and Malay Peninsula.

***Silurichthys*, sp.**

Specimens examined.—Mawai District, Jahore State, British Malaya. two examples. 31074.

5. Genus *Silurus*, Linnaeus.

1758. *Silurus* Linnaeus, *Syst. Nat.*, p. 304 (type; *Silurus glanis* Linnaeus. 1758, p. 304, by subsequent designation of Bleeker, 1862, p. 393).
 1856. *Glanis* Agassiz, *Proc. Amer. Acad. Arts & Sci.* III, p. 333 (type by monotype, *Glanis aristotelis* Agassiz, 1856, p. 333, preoccupied by *Glanis Rafinesque* 1818).
 1861. *Pterocryptis* Peters, *Monatsb. Konig, Akad. Wissens. Berlin*, p. 712 (type by monotype, *Pterocryptis gangetica* Peters, 1861, p. 712, equals *Silurus cochinchinensis* Cuvier & Valenciennes, 1839, p. 352).
 1862. *Parasilurus* Bleeker, *Versal. Akad. Amsterdam* XIV, p. 392 (type by original designation, *Silurus japonicus* Temminck & Schlegel, 1847, p. 226, equals *Silurus asotus* Linnaeus; 1758, p. 304).
 1905. *Apodoglanis* Fowler, *Proc. Acad. Sci. Philadelphia*, p. 463 (type by original designation, *Apodoglanis furnessi*, Fowler, 1905, p. 463).
 1933. *Herklotsella* Herre, *Hong Kong Naturalist* IV, p. 179 (type by original designation, *Herklotsella anomala* Herre, 1933, p. 179, equal *Silurus cochinchinensis* Cuvier & Valenciennes, 1939, p. 352).

***Silurus aristotelis* (Agassiz).**

1856. *Glanis aristotelis*, Agassiz, *Proc. Amer. Acad. Arts. & Sci.* III, p. 333 (type-locality Greece).
 1890. *Silurus aristotelis*, Garman, *Bull. Essex Inst.* XXII; p. 8.
 1892. *Parasilurus aristotelis*, Hoffman & Jordan, *Proc. Acad. Nat. Sci. Philadelphia*, p. 241.
 1936. *Silurus asotus* var. *aristotelis*, Tchang, *Bull. Fan Mem. Inst. Biology (Zoology)*, VII; p. 37.

Range.—Greece.

***Silurus asotus*, Linnaeus.**

1758. *Silurus asotus*, Linnaeus, *Syst. Nat.* p. 304 (type-locality, Asia).

***Silurus asotus*, Linnaeus.**

1758. *Silurus asotus*, Linnaeus, *Syst. Nat.*, p. 304 (type-locality, Asia).
 1787. *Silurus dauricus*, Pallas, *Nova Acta Acad. Petropol.* I; p. 359, pl. ii; fig. 2 (type-locality, Dauria).
 1839. *Silurus dauricus*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV, p. 351.
 1842. *Silurus punctatus*, Cantor, *Ann. Mag. Nat. Hist.* (1) IX, p. 485 (type-locality, Chusan, China).

1844. ?*Silurus sinensis*, McClelland, *Cal. Jour. Nat. His.* II, p. 402. (type-locality, Chusan, China).
 1944-45. *Silurus xanthosteus*, Richardson, in *Hinds, R. Brinsely, The Zoology of the voyage of H. M. S. "Sulphur" Etc.* . . . London I, p. 133, pl. lvi, figs. 12-14 (type-locality, Chusan and Canton, China).
 1846. *Silurus sinensis*, Richardson, *Rept. Brit. Assoc. Advancement of Sciences* for 1845, p. 281.
 1847. *Silurus japonicus*, Temminck & Schlegel, in *Siebold; Phillip Frang, Fauna Japonica. Lugduni Batavorum*, p. 226, pl. civ; fig. 1 (type-locality, Japan).
 1864-67. *Silurus asotus*, Kner, *Zoologisch. Theil. Fische. Vienna*, p. 303.
 1901. *Parasilurus asotus*, Abbott, *Proc. U. S. Nat. Mus.* XXIII, p. 483.
 1943. *Parasilurus asotus asotus*, Nichols, *Nat. Hist. Central Asia* IX, p. 34.
 1913. *Silurichthys schneideri*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 198.

Range.—China, Japan, and Eastern Russia.

Specimens examined.

- Canton ; Kwantung Prov.; China; one example. 24207.
 " " " " three examples. 24230.
 " " " " three examples. 28164.
 Hong Kong; China; one example. 28007.
 Tien-Tsin; Hopeh Prov.; China; three examples. 6441.
 Tsien Tang R.; Chekiang Prov.; China; two examples. 32533.
 Tinghai; Chusan Id.; China; one example. 32493.
 Chusan Id. China; four examples. 33918.
 " " " one example. 33919.
 Tamusui R.; Formosa; one example. 23019.
 Inzampo; Formosa; two examples. 23170.
 Korea; two examples. 26537.
 Chikugo R.; Kurume; Kyushu Id.; Japan, two examples. 7835.
 Lake Biwa; Honshu Id.; Japan; two examples. 7870.
 Tsuchiura; " " " ; one example. 7891.

***Silurus asotus bedfordi*, Regan.**

1908. *Silurus bedfordi*, Regan, *Proc. Zool. Soc. London*, p. 61; pl. ii, fig. 3 (type-locality, Kimhoa and Chong-ju, Korea).
 1943. *Parasilurus asotus bedfordi*, Nichols, *Nat. Hist. Central Asia* IX, p. 35.

Range.—Chekiang, China and Korea.

Specimens examined.—Seoul, Korea, one example. 23628.

***Silurus asotus longus* (Wu).**

1930. *Parasilurus asotus longus*, Wu, *Bull. du Mus. d' Hist. Nat.* (2) II, p. 225. fig. 1 (type-locality, near Tien-tai Mountain, Tchekiang; China).
 1937. *Silurus asotus* var. *longus*, Tchang, *Bull. Fan. Mem. Inst. Biology (Zoology, VII, p. 143.)*
 1943. *Parasilurus asotus longus*, Nichols, *Nat. Hist. Central Asia* IX, p. 35.

Range.—Chekiang, China.

***Silurus chantrei*, Sauvage.**

1882. *Silurus chantrei*, Sauvage, *Bull. de la Soc. Philomathiq. d. Paris* (7) VI. p. 163 (type-locality, supposedly Kura River, Tiflis, Southern U. S. S. R., in reality from Syria or basin of the Tigris, vide Berg; 1933, p. 587).
 1884. *Silurus chantrei*, Sauvage, *Nouvel. Archiv. du Mus. d' Hist. Nat.* (2) VII, p. 19; pl. i, fig. 1.

Range.—Probably Asia Minor.

Silurus cinereus Dabry.

1872. *Silurus cinereus*, Dabry, *La pisciculture et la peche in China*, p. 189 (type-locality, Yangtse, China).
 1928. *Parasilurus cinereus*, Rendahl, *Ark. f. Zool.* XXA, p. 161.
 1943. *Parasilurus cinereus*, Nichols, *Nat. Hist. Central Asia* IX, p. 34.

Range.—Yangtse, China.

Silurus cochinchinensis Cuvier & Valenciennes.

1839. *Silurus cochinchinensis*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV, p. 352 (type-locality, Cochinchina).
 1860. *Silurichthys berdmorei*, Blyth, *Journ. As. Soc. Bengal* XXIX, p. 156 (type-locality, Tenasserim, Bengal).
 1861. *Pterocryptis gangetica*, Peters, *Monats. Konig; Akad. Wissens. Berlin*, p. 712 (type-locality, Ganges, probably in Assam or the eastern Himalayas, *vide* Hora, 1936a, p. 355).
 1864. *Silurus afghana*, Günther, *Cat. Fish. Brit. Mus.* V, p. 34 (type-locality Afghanistan is probably erroneous, most likely should be Assam, *vide* Hora, 1936a, p. 354).
 1864. *Silurus cochinchinensis*, Günther, *ibid.*, V, p. 34.
 1864. *Cryptopterus gangeticus*, Gunther, *ibid.*, V, p. 44.
 1868. *Silurus punctatus*, Day, *Proc. Zool. Soc. London*, p. 155 (type-locality, Wynaad, India) (not *S. punctatus* Cantor, 1842, p. 485).
 1873. *Silurus wynaadensis*, Day, *ibid.*, p. 237 (type-locality, Wynaad, India).
 1873. *Silurus dukai*, Day, *ibid.*, p. 239 (type-locality, Darjeeling, India).
 1878-88. *Callichrous gangeticus*, Day, *Fish. India*, p. 476.
 1878-88. *Silurus wynaadensis*, Day, *ibid.*, p. 480, pl. 111, fig. 6.
 1878-88. *Silurus cochinchinensis*, Day, *ibid.*, p. 481, pl. 113, fig. 2.
 1933. *Herklotsella anomala*, Herre, *Hong Kong Naturauilist* IV, p. 179 (type-locality, Hong Kong).
 1937. *Penesilurus bokorensis*, Pellegrin & Chevey, *Bull. de la Soc. Zoologique de France* LXXII, p. 315 (type-locality, Bokor, Cambodia).
 1941. *Silurus cochinchinensis*, Hora & Gupta, *Bull. Raffl. Mus., Singapore*, No. 17, p. 18.
 1943. *Parasilurus cochinchinensis*, Nichols, *Nat. Hist. Central Asia* IX, p. 35.
 1943. *Parasilurus anomalus*, Nichols, *ibid.*, IX, p. 35.
 1945. *Parasilurus cochinchinensis*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 333.

Range.—Cochinchina, Siam, Malay Peninsula (Kedah), Burma and India.

Specimens examined.—

- Hong Kong, China, one example. 26769 (holotype of *Herklotsella anomala*).
 „ „ two examples. 14841 (partypes of *H. anomala*).
 „ „ one example. 30271.
 „ „ one example. 31659.
 Mountain stream near Ting Wu Monastery, Kwantung Prov. China, twelve examples. 32800.
 Nodda, Hainan Id., Kwantung Prov. China, two examples. 31763.
 Central part of Hainan Id., Kwantung Prov., China, one example. 39627.
 Kalimpong Duars and Siliguri Terai, Tista R. drainage, Bengal Prov., India, one example. 41890.

Silurus (?) furnessi (Fowler).

1905. *Apodoglanis furnessi*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 463, fig. 2 (type-locality, Borneo).

Range.—Borneo.

Silurus gilberti Hora.

1936. *Silurus wynaadensis*, Tchang, *Bull. Fan Mem. Inst. Biology (Zoology VII)*, p. 35 (not *S. wynaadensis* Day, 1873; p. 237) (type-locality, Lunchow, China).
 1937. *Silurus sinensis*, Hora, *Rec. Ind. Mus.* XXXIX, p. 341 (replaces *S. wynaadensis* Tchang, 1936, p. 35, preoccupied by *Silurus sinensis* McClelland, 1844, equals *S. asotus* Linnaeus, 1758).
 1938. *Silurus gilberti*, Hora, *Rec. Ind. Mus.* XL, p. 243 (replaces *S. sinensis* Hora, 1937, p. 341).

Range.—Lunchow, China.

Silurus glanis Linnaeus.

1758. *Silurus glanis*, Linnaeus, *Syst. Nat.*, p. 304 (type locality, Asia and Europe).
 1839. *Silurus glanis*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV; p. 323.
 1858. *Silurus glanis*, Heckel & Kner, *Die süsswasserfische der osterreichische etc.*, p. 308.
 1895. *Silurus glanis*, Fries; Ekstrom, & Sundevall, *A history of Scandinavian Fishes*, pt. 2; p. 693.
 1933. *Silurus glanis*, Berg; *Les poiss. d. eaux Lonc. d. l'U. R. S. S.*; p. 585.

Range.—Eastern and Northern Europe and Asia Minor.

Specimens examined.—Volga R., Samara, Russia, two examples. 20587.

Silurus goae, sp. nov.

Specimens examined.—Goa, Portuguese India, one example. 41889 (holotype). Trivandrum, Travancore, India, one example. 41888 (paratype).

Silurus grahami Regan.

1907. *Silurus grahami*, Regan, *Ann. Mag. Nat. Hist.* (7) XIX; p. 64 (type-locality, Yunnan, China).
 1943. *Parasilurus grahami*, Nichols, *Nat. Hist. Central Asia IX*; p. 34.

Range.—Yunnan, China.

Silurus mento Regan.

1904. *Silurus mento*, Regan, *Ann. Mag. Nat. Hist.* (7) XIII; p. ? (type-locality, Yunnan Fu, China).
 1943. *Parasilurus mento*, Nichols, *Nat. Hist. Central Asia IX*, p. 34.

Range.—Yunnan, China.

Silurus microdorsalis (Mori).

1936. *Parasilurus microdorsalis*, Mori, *Doubutsugaku Zasshi XLVIII*; p. ? (type-locality, Chosen).

Range.—Korea.

6. Genus **Wallago** Bleeker.

- 1851b. *Wallago* Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 198 (type, *Silurus mulleri*, Bleeker, 1846a, p. 284, equals *Silurus attu* Bloch & Schneider, 1801, p. 378, equals *Wallago russellii*, Bleeker, 1853b, p. 108, by subsequent designation of Bleeker, 1862, p. 394).
- 1864-67. ?*Silurodon* Kner, *Zoologisch. Theil. Fische. Vienna*, p. 305 (type by monotypy, *Silurodon hexanema* Kner, 1864-67, p. 305).
1938. *Wallagonia* Myers, *Copeia*, No. 2, p. 98 (type by original designation, *Wallago leerii* Bleeker 1851c, p. 427).

Wallago attu (Bloch & Schneider).

1801. *Silurus attu*, Bloch & Schneider, *Syst. Ichthyol.*, p. 378, pl. lxxv (type-locality, Malabar).
1822. *Silurus boalis*, Hamilton, *Fish. Ganges*, p. 154, pl. xxix, fig. 49 (type-locality, River Ganges, India).
1838. *Schilbe boalis*, Sykes, *Trans. Zool. Soc.* II, p. 368, pl. lxiv, fig. 2.
1839. *Callichrus macrostomus*, Swainson, *Natural history and Classification of Fishes etc.* II, p. 306 (type-locality not given).
1839. *Silurus wallagoo*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV, p. 354 (type-locality, Bengal).
- 1846a. *Silurus mulleri*, Bleeker, *Nat. Gen. Arch. Ned. Ind.* III, p. 284 (type-locality, Batavia, Java).
- 1851b. *Wallago mulleri*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 198.
1852. *Wallago mulleri*, Bleeker, *ibid.*, III, p. 585.
- 1853b. *Wallago russellii*, Bleeker, *Verh. Batav. Genootsch* XXV, p. 108 (type-locality, Calcutta and Batavia).
1858. *Wallago russellii*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 262.
- 1862a. *Wallago attu*, Bleeker, *Atl. Ichthyol.* II, p. 79, pl. lxxxvi, fig. 1.
- 1878-88. *Wallago attu*, Day, *Fish. India*, p. 479, pl. cxi, fig. 4.
1913. *Wallago attu*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 201.
1938. *Wallagonia attu*, Myers, *Copeia*, No. 2, p. 98.
1939. *Wallagonia attu*, Hóra, *Jour. Bomay Nat. Hist. Soc.* XLI, p. 64.
1945. *Wallagonia attu*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 332.

Range.—Java, Sumatra, Ceylon, India, Burma, Siam and Indo-china.

Specimens examined.—

- Poona, Bombay Pres., India, one example. 34869.
- Pulta, India, one example. 34870.
- Nidadavolw, Vizagapatam Dist., Madras Pres., India, one example. 41891.
- Bisrampur, Central Pro., India, one example. 41892.

Wallago (?) hexanema (Kner).

- 1864-67. *Silurodon hexanema*, Kner, *Zoologisch. Theil. Fische. Vienna*, p. 305, pl. xii, fig. 2 (type-locality, Shanghai, China, probably erroneous).
1943. *Silurodon hexanema*, Nichols, *Nat. Hist. Central Asia* IX, p. 36.

Range.—Not known.

Wallago leerii Bleeker.

- 1851c. *Wallago leerii*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 427 (type-locality, Borneo).
1858. *Wallago leerii*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 264.

1862a. *Wallago leerii*, Bleeker, *Atl. Ichthyol.* II, p. 80, pl. 85.

1913. *Wallago leerii*, Weber & Beaufort, *Fish. Ind. Austral. Archipel.* II, p. 202.

1938. *Wallagonia leerii*, Myers, *Copeia*, No. 2, p. 98.

Range.—Sumatra and Borneo.

Wallago miostoma Vaillant.

1902. *Wallago miostoma*, Vaillant, *Poissons. Notes from the Leyden Mus.* XXIV, p. 44 (type-locality, Borneo).

1902. *Wallago nebulosus*, Vaillant, *ibid.*, XXIV, p. 46 (type-locality, Borneo).

1905. *Ompok nebulosus*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 465.

1913. *Wallago miostoma*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 202, fig. 78.

1938. *Wallagonia miostoma*, Myers, *Copeia*, No. 2, p. 98.

1945. *Wallagonia miostoma*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 332.

Range.—Borneo, Sumatra, Siam and Malay Peninsula.

Specimens examined.—Singapore, Straits Settlements, British Malaya, one example. 14859.

Wallago tweediei (Hora & Misra).

1941. *Wallagonia tweediei*, Hora & Misra (*in* Hora & Gupta, 1941, *Bull. Raffles Mus.*, Singapore, No. 17, p. 18, figs. 2-3) (type-locality, Pahang, Malay Peninsula).

Range.—Malay Peninsula (Pahang).

7. Genus *Hito* Herre.

1924a. *Hito* Herre, *Philippine Jour. Sci.* XXIV, p. 702 (type by original designation, *Hito taytayensis* Herre, 1924a, p. 703).

1924b. *Hitoichthys* Herre, *Proc. Pan-Pacific Sci. Congress* II, p. 1570 (substitute for *Hito*: same type).

1924a. *Penesilurus* Herre, *Philippine Jour. Sci.* XXIV, p. 703 (type by original designation, *Penesilurus palavanensis* Herre, 1924a, p. 704).

Hito taytayensis Herre.

1924a. *Hito taytayensis*, Herre; *Philippine Jour. Sci.* XXIV, p. 703 (type-locality, Taytay, Palawan, Philippine Isds).

1924b. *Hitoichthys taytayensis*, Herre, *Proc. Pan-Pacific Sci. Congress* II, p. 1570.

1924a. *Penesilurus palavanensis*, Herre, *Philippine Jour. Sci.* XXIV, p. 704, (type-locality, Lake Manguao, Palawan, Philippine Isds).

1924b. *Penesilurus palavanensis*, Herre, *Proc. Pan-Pacific Sci. Congress* II, p. 1570.

Range.—Palawan, Culion and Busuanga, Philippine Isds.

Specimens examined.—

Creek flowing into Halsey Harbour, Culion Id., Philippine Isds., twenty-five examples. 27108.

Karig Malan Creek, Culion Id., Philippine Isds., twenty examples. 27290.

San Nicolas, Busuanga Id., Philippine Isds., three examples. 38374.

Watan Creek, Busuanga Id., Philippine Isds., eleven examples. 38375.

Singay, Busuanga Id., Philippine Isds., four examples. 39152.

8. Genus *Ompok* Lacépède.

1803. *Ompok* Lacépède, *Hist. Nat. Poiss.* V, p. 49 (type- by monotypy, *Ompok siluroides* Lacépède, 1803, p. 49).
1803. *Ompok* Lacépède, *ibid.*, V, pl. i, fig. 2 (misspelling).
1822. *Callichrous* Hamilton, *Fish. Ganges*, p. 149 (type, *Silurus (Callichrous) pabda* Hamilton, 1822, p. 150, equals *Ompok siluroides* Lacépède, 1803, p. 49, *Silurus bimaculatus* Bloch, 1797, p. 17, by subsequent designation of Bleeker, 1862, p. 395).
1858. *Silurodes* Bleeker, *Ichthyol. Archipel. Ind.* I; p. 271 (type, *Silurus hypophthalmus* Bleeker, 1846, p. 149, by subsequent designation of Bleeker; 1862, p. 394).
1858. *Pseudosilurus* Bleeker, *ibid.*, I, p. 275 (type, *Silurus (Callichrous) pabda* Hamilton, 1822, p. 150, equals *Ompok siluroides* Lacépède, 1803, p. 49, equals *Silurus bimaculatus* Bloch, 1797, p. 17, by subsequent designation of Bleeker, 1862, p. 395).

Ompok bimaculatus (Bloch).

1797. *Silurus bimaculatus*, Bloch, *Ichthyol. Hist. Nat. d. Poiss.*, pt. II, p. 17, pl. ccclxiv (type-locality, Malabar).
1803. *Ompok siluroides*, Lacépède, *Hist. Nat. Poiss.* V, p. 49, pl. i, fig. 2 (fig. misspelled *Ompock*) (type-locality not given, probably Batavia).
1822. *Silurus chechra*, Hamilton, *Fish. Ganges*, p. 152 (type-locality, Kosi R., India).
1822. *Silurus canio*, Hamilton, *ibid.*, p. 151 (type-locality, north-eastern Bengal).
1822. *Silurus canio*, Hamilton, *ibid.*, p. 151 (type-locality, north-eastern Bengal).
1822. *Silurus duda*, Hamilton, *ibid.*, p. 152 (type-locality, Kosi R., India).
1822. *Silurus pabda*, Hamilton, *ibid.*, p. 150, pl. xxv, fig. 47 (type-locality, Bengal, India).
1838. *Silurus lamghur*, Heckel, *Fisch. Caschmir*, p. 82 (type-locality, Kashmir, India).
1838. *Schilbe pabo*, Sykes, *Trans. Zool. Soc.* II, p. 367 (not *Silurus pabo* Hamilton, 1822, p. 153) (type-locality, Deccan, India).
1839. *Callichrus nebulosus*, Swainson, *The Natural history & Classification of Fishes etc.* II, p. 306 (equals *Silurus chechra* Hamilton, 1822, p. 152).
1839. *Callichrus bimaculatus*, Swainson, *ibid.*, II, p. 306.
1839. *Callichrus vittatus*, Swainson, *ibid.*, II, p. 306 (equals *Silurus pabda* Hamilton, 1822, p. 150).
1839. *Callichrus immaculatus*, Swainson, *ibid.*, II, p. 306 (equals *Silurus canio* Hamilton, 1822, p. 151).
1839. *Callichrus affinis*, Swainson, *ibid.*, II, p. 306 (equals *Silurus duda* Hamilton, 1822, p. 152).
1839. *Silurus bimaculatus*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV, p. 360.
1839. *Silurus anostomus*, Cuvier & Valenciennes, *ibid.*, XIV, p. 363 (type-locality, Bengal).
1839. *Silurus pabda*, Cuvier & Valenciennes, *ibid.* XIV, p. 364.
1839. *Silurus mysoricus*, Cuvier & Valenciennes, *ibid.*, XIV, p. 364. (type-locality, Mysore, India).
1839. *Silurus microcephalus*, Cuvier & Valenciennes, *ibid.*, XIV, p. 365 (type-locality, Bengal).
1839. *Silurus malabaricus*, Cuvier & Valenciennes, *ibid.*, XIV, p. 353 (type-locality, Malabar, India).
1842. *Silurus indicus*, McClelland, *Cal. Jour. Nat. Hist.* II, p. 583 (type-locality, India).
1845. *Silurus bimaculatus*, Bleeker, *Nat. Gen. Arch. Ned. Ind.* II, p. 511.

1852. *Wallago bimaculatus*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 585.
 1853b. *Wallago microcephalus*, Bleeker, *Verh. Batav. Genootsch* XXV, p. 110.
 1853b. *Wallago bimaculatus*, Bleeker, *ibid.*, XXV, p. 54.
 1853b. *Wallago malabaricus*, Bleeker, *ibid.*, XXV, p. 54.
 1853b. *Wallago pabda*, Bleeker, *ibid.*, XXV, p. 54.
 1853b. *Wallago anostomus*, Bleeker, *ibid.*, XXV, p. 109.
 1858. *Pseudosilurus bimaculatus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 275.
 1858. *Phalacronotus siluroides*, Bleeker, *ibid.*, I, p. 304.
 1860. *Pseudosilurus macrophthalmos*, Blyth, *Jour. As. Soc. Bengal* XXIX, p. 156 (type-locality, Tenasserim, Bengal, India).
 1862a. *Callichrous bimaculatus*, Bleeker, *Versl. Akad. Amsterdam* XIV, p. 84, pl. lxxxvii, fig. 3.
 1864. *Callichrous bimaculatus*, Günther, *Cat. Fish. Brit. Mus.* V, p. 45.
 1864. *Callichrous ceylonensis*, Günther, *ibid.*, V, p. 46 (type-locality, Ceylon).
 1864. *Callichrous chechra*, Günther, *ibid.*, V, p. 46.
 1864. *Callichrous anostomus*, Günther, *ibid.*, V, p. 47.
 1864. *Callichrous pabda*, Günther, *ibid.*, V, p. 47.
 1864. *Callichrous canio*, Günther, *ibid.*, V, p. 48.
 1864. *Silurichthys lamghur*, Günther, *ibid.*, V, p. 36.
 1867. *Cryptopterus latovittatus*, Playfair, *Proc. Zool. Soc. London*, p. 16 (type-locality, Cachar, India).
 1869a. *Callichrous macrophthalmus*, Day, *ibid.*, p. 613.
 1869a. *Callichrous notatus*, Day, *ibid.*, p. 616 (type-locality, Burma).
 1871. *Callichrous egertoni*, Day, *ibid.*, p. 710 (type-locality, Punjab, India).
 1878-88. *Callichrous bimaculatus*, Day, *Fish. India*, p. 476, pl. cx, figs. 4-5.
 1878-88. *Callichrous sindensis*, Day, *ibid.*, p. 476, pl. cx, fig. 1 (type-locality, Sind, India).
 1878-88. *Callichrous macrophthalmus*, Day, *ibid.*, p. 478, pl. cx, figs. 2-3.
 1913. *Callichrous bimaculatus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 209.
 1934a. *Wallago krattensis*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 335, fig. p. 336 (type-locality, Kratt, South-east Siam).
 1935. *Ompok bimaculatus*, Fowler, *ibid.*, p. 96.
 1938. *Ompok pabda*, Fowler, *Fish. Bull., Singapore*, No. 1, pp. 45, 248.
 1945. *Ompok bimaculatus*, Smith, *U. S. Nat. Mus. Bull.* No. 188, 337.

Range.—Sumatra, Java, Borneo, Malaya, Siam, Indo-China, India, Burma and Ceylon.

Specimens examined.—

- Tungabhadra R., Dharwar, Bombay Pres., India, one example. 41885.
 Vizagapatam, Madras Pres., India, one example. 41886.
 Sheonath R., Birsampur, Central Prov., India, three examples. 41887.
 Calcutta, Bengal Prov., India, sixteen examples. 34864.
 Calcutta, Bengal Prov., India, one example. 34865.
 Ceylon, three examples. 22913.
 Colombo, Ceylon, three examples. 30177.
 Peradeniya, Ceylon, one example. 30178.
 Galatabendiyava, Nikateraviya, Ceylon, one example. 30179.
 Rangoon, Burma, ten examples. 33790.
 Rangoon, Burma, one example. 33796.
 Kao Sabap, stream tributary to Chantabun R., S. E. Siam, one example. 28824.
 Singora, Siam, one example. 31069.

- Singapore, Straits Settlements, British Malaya, two examples. 31070
 Bukit Merah, Perak State, British Malaya, one example. 32735.
 Bukit Sago, Kuantan, Pahang State, British Malaya, two examples.
 32899.
 Buitenzorg, Java, two examples. 20469.
 Batavia, Java, four examples. University of Michigan (uncatalogued).

Ompok borneensis (Steindachner).

1901. *Callichrous borneensis*, Steindachner, *Abhandl. Sinckenberg. Naturforsch. Gesellsch.* XXV, p. 45 (type-locality, Serawal, Borneo).
 1913. *Silurodes borneensis*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 206.

Range.—Borneo.

Ompok eugeneiatus (Vaillant).

1893. *Callichrous eugeneiatus*, Vaillant, *Bull. de la Soc. Zoologiq. d. Franc* XVIII, p. 61 (type-locality, Borneo).
 1893a. *Callichrous eugeneiatus*, Vaillant, *Nouvell. Archiv. Mus. d. Hist. Nat.* (3) V, p. 65, pl. ii, fig. 3.
 1912. *Silurodes eugeneiatus*, Weber & Beaufort, in *Maas Alfrd, Durch Zentral-Sumatra* II, p. 534.
 1913. *Silurodes eugeneiatus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 207, fig. 80.

Range.—Borneo.

Ompok hypophthalmus (Bleeker).

1846. *Silurus hypophthalmus*, Bleeker, *Nat. Gen. Ned. Ind.* III, p. 149 (type-locality, Batavia, Java).
 1851b. *Silurus macronema*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 203 (type-locality, Borneo).
 1858. *Silurodes hypophthalmus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 272.
 1858. *Silurodes macronema*, Bleeker, *ibid.*, I, p. 273.
 1862a. *Silurodes hypophthalmus*, Bleeker, *Atl. Ichthyol.* II, p. 83, pl. lxxxviii, fig. 2.
 1862a. *Silurodes macronema*, Bleeker, *ibid.*, II, p. 83, pl. lxxxviii, fig. 1.
 1864. *Callichrous hypophthalmus*, Günther, *Cat. Fish. Brit. Mus.* V p. 48.
 1864. *Callichrous macronema*, Günther, *ibid.*, V, p. 49.
 1913. *Silurodes hypophthalmus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 205.
 1945. *Silurodes hypophthalmus*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 336.

Range.—Borneo, Java, Sumatra, Siam and Malay Peninsula.

Specimens examined.—Telok Anson, Perak State, British Malaya, one example. 31077. Pasak R., Siam, one example. U. S. National Museum 103225.

Ompok (?) javanensis (Hardenberg).

1938. *Belodontichthys javanensis*, Hardenberg, *Treubia* XVI, p. 311 (type-locality, Java).

Range.—Java.

Ompok leiacanthus (Bleeker).

1853. *Wallago leiacanthus*, Bleeker, *Nat. Tijds. Ned. Ind.* V, p. 189 (type-locality, Banka).

1858. *Pseudosilurus leiacanthus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 281.
 1862a. *Callichrous leiacanthus*, Bleeker *Atl. Ichthyol.* II, p. 85, pl. lxxxix, fig. 2.
 1864. *Callichrous liacanthus*, Günther, *Cat. Fish. Brit. Mus.* V, p. 47.
 1905. ?*Ompok jaynei*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 466 (type-locality, Borneo).
 1913. *Callichrous leiacanthus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 208, fig. 82.
 1940. *Ompok leiacanthus*, Herre, *Bull. Raffl. Mus. Singapore*, No. 16, p. 53.

Range.—Sumatra, Borneo, and Malaya (Singapore).

Specimens examined.—Mandai Road, Singapore, Straits Settlements, British Malaya, one example. 32702.

Ompok pabo (Hamilton).

822. *Silurus pabo*, Hamilton, *Fish. Ganges*, p. 153, pl. xvii, fig. 48 (type-locality, Brahmaputra R., near Assam, India).
 864. *Callichrous pabo*, Günther, *Cat. Fish. Brit. Mus.* V, p. 48.
 1869a. *Callichrous nigrescens*, Day, *Proc. Zool. Soc. London*, p. 616 (type-locality, Burma).
 1878-88. *Callichrous pabo*, Day, *Fish. India*, p. 477, pl. cx, fig. 6.
 1929. *Callichrous pabo*, Prashad & Mukerji, *Rec. Ind. Mus.* XXXI, p. 177.

Range.—Northeast India and Burma.

Ompok weberi (Hardenberg).

1937. *Callichrous weberi*, Hardenberg, *Treubia* XVI, p. 9 (type-locality, Borneo).
 1938. *Callichrous weberi*, Hardenberg, *ibid.*, XVI, p. 232.

Range.—Borneo.

9. Genus *Kryptopterus* Bleeker.

1858. *Kryptopterus* Bleeker, *Ichthyol. Archipel. Ind.* I, p. 283 (type, *Silurus kryptopterus* Bleeker, 1851, p. 270, equals *Kryptopterus micropus* Bleeker, 1858, p. 284, by subsequent designation of Bleeker, 1862, p. 395).
 1958. *Kryptopterichthys* Bleeker, *ibid.*, I, p. 288 (type, *Silurus bicirrhys* Cuvier and Valenciennes, 1839, p. 367, equals *Kryptopterichthys Palembangensis* Bleeker, 1858, p. 288, by subsequent designation of Bleeker, 1862, p. 395).
 1858. *Micronema* Bleeker, *ibid.*, I, p. 298 (type *Silurus micronemus* Bleeker, 1846a, p. 289, equals *Micronema typus* Bleeker, 1858, p. 300, by subsequent designation of Bleeker, 1862, p. 395).
 1858. *Phalacronotus* Bleeker, *ibid.*, I, p. 302 (type, *Silurus apogon* Bleeker, 1851a, p. 67, equals *Phalacronotus leptonema*, Bleeker, 1858, p. 304, by subsequent designation of Bleeker, 1862, p. 395).

***Kryptopterus apogon* (Bleeker).**

- 1851a. *Silurus apogon*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 67 (type-locality, Borneo).
 1852. *Silurus leptonema*, Bleeker, *ibid.*, III, p. 584 (type-locality, Palembang, Sumatra).
 1855. *Silurus micropogon*, Bleeker, *ibid.*, IX, p. 419 (type-locality, Borneo).
 1858. *Phalacronotus leptonema*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 304.
 1858. *Phalacronotus micropogon*, Bleeker, *ibid.*, I, p. 306.
 1862a. *Phalacronotus leptonema*, Bleeker, *Atl. Ichthyol.* II, p. 92, pl. lxliv, fig. 2.

- 1862a. *Phalacronotus micropogon*, Bleeker, *ibid.*, II, p. 92 pl. lxliv, fig. 1.
 1864. *Cryptopterus micropogon*, Günther, *Cat. Fish. Brit. Mus.* V, p. 43.
 1913. *Cryptopterus apogon*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 221, fig. 87.
 1933. *Kryptopterus apogon*, Smith, *Jour. Siam Soc., Nat. Hist. Suppl.* IX, p. 75.
 1945. *Kryptopterus apogon*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 343.

Range.—Sumatra, Borneo, and Siam.

Kryptopterus bicirrhys (Cuvier & Valenciennes).

1839. *Silurus bicirrhys*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XIV, p. 367 (type-locality, Java).
 1852. *Silurus palembangensis*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 584 (type-locality, Palembang, Sumatra).
 1858. *Kryptoptericthys palembangensis*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 290.
 1858. *Kryptoptericthys bicirrhys*, Bleeker, *ibid.*, I, p. 292.
 1862a. *Kryptoptericthys palembangensis*, Bleeker, *Atl. Ichthyol.* II, p. 88, pl. lxl, fig. 3.
 1862a. *Kryptoptericthys bicirrhys*, Bleeker, *ibid.*, II, p. 89, pl. lxl, fig. 1.
 1864. *Cryptopterus amboinensis*, Günther, *Cat. Fish. Brit. Mus.* V, p. 40 (type-locality, Amboyan, S. China Sea).
 1864. *Cryptopterus palembangensis*, Günther, *ibid.*, V, p. 40.
 1864. *Cryptopterus bicirrhys*, Günther, *ibid.*, V, p. 41.
 1905. *Kryptopterus palembangensis*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 468.
 1913. *Cryptopterus bicirrhys*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 217.
 1935. *Kryptopterus bicirrhys*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 96.
 1945. *Kryptopterus bicirrhys*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 341.

Range.—Java, Sumatra, Borneo, Siam, and Malay Peninsula.

Specimens examined.—Streams near Bentong, Pahang State, British Malaya, three examples. 31980.

Kryptopterus bleekeri Günther.

1864. *Cryptopterus bleekeri*, Günther, *Cat. Fish. Brit. Mus.* V, p. 44 (type-locality, Siam).
 1865. *Micronema bleekeri*, Bleeker, *Ned. Tijdschr. Dierk.* II, p. 34.
 1945. *Kryptopterus bleekeri*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 344.

Range.—Siam and Indo-China.

Kryptopterus cheveyi Durand.

1940. *Cryptopterus cheveyi*, Durand, *Inst. Oceanographique d. l'Indochine* No. 36, p. 19, pl. iv (type-locality, Kaskos, R., Cambodia).

Range.—Cambodia, Indo-China.

Kryptopterus cryptopterus (Bleeker).

1851. *Silurus cryptopterus*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 270 (type-locality, Borneo).
 1858. *Kryptopterus micropus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 284 (type-locality, Sumatra and Borneo).

- 1862a. *Kryptopterus micropus*, Bleeker, *Atl. Ichthyol.* II, p. 86, pl. lxxxix, fig. 3.
 1864. *Cryptopterus micropus*, Günther, *Cat. Fish. Brit. Mus.* V, p. 42.
 1905. *Kryptopterus cryptopterus*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 468.
 1913. *Cryptopterus cryptopterus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 218.
 1945. *Kryptopterus cryptopterus*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 340.

Range.—Borneo and Sumatra to Malaya and Siam.

Specimens examined.—Menam Chao Phya at Bangkok, Siam, one example. 28829.

***Kryptopterus hexapterus* (Bleeker).**

- 1851b. *Silurus hexapterus*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 203 (type-locality, Borneo).
 1858. *Micronema hexapterus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 301.
 1862a. *Micronema hexapterus*, Bleeker, *Atl. Ichthyol.* II, p. 91, pl. lxxli, fig. 1.
 1864. *Cryptopterus hexapterus*, Günther, *Cat. Fish. Brit. Mus.* V, p. 43.
 1913. *Cryptopterus hexapterus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 222.
 1934. *Kryptopterus hexapterus*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 87.
 1945. *Kryptopterus hexapterus*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 342.

Range.—Sumatra, Java, Borneo, and Siam.

***Kryptopterus lais* (Bleeker).**

- 1851c. *Silurus lais*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 428 (type-locality Borneo).
 1858. *Kryptopterichthys lais*, Bleeker, *Ichthyol. Archipel. Ind.* II, p. 291.
 1862a. *Kryptopterichthys lais*, Bleeker, *Atl. Ichthyol.* II, p. 88, pl. lxi, fig. 2.
 1864. *Cryptopterus lais*, Günther, *Cat. Fish. Brit. Mus.* V, p. 42.
 1913. *Cryptopterus lais*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 218.

Range.—Borneo.

***Kryptopterus limpok* (Bleeker).**

1852. *Silurus limpok*, Bleeker, *Nat. Tijds. Ned. Ind.* III, p. 583 (type-locality, Palembang, Sumatra).
 1858. *Kryptopterus limpok*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 286.
 1862a. *Kryptopterus limpok*, Bleeker, *Atl. Ichthyol.* II, p. 87, pl. 91, fig. 2.
 1864. *Cryptopterus limpok*, Günther, *Cat. Fish. Brit. Mus.* V, p. 39.
 1913. *Cryptopterus limpok*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 219.
 1945. *Kryptopterus limpok*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 340.

Range.—Sumatra, Borneo, Siam, and Malay Peninsula (Pahang).

***Kryptopterus lumholtzi* Rendahl.**

1922. *Cryptopterus lumholtzi*, Rendahl, *Nyt. Magazin f. Naturvidensk., Zoolog. Mus. Kristiana*, No. 6 p. 200 (type-locality, Borneo).

Range.—Borneo.

Kryptopterus macrocephalus (Bleeker).

1858. *Kryptopterichthys macrocephalus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 293 (type-locality, Sumatra?).
- 1862a. *Kryptopterichthys macrocephalus*, Bleeker, *Atl. Ichthyol.* II, p. 89, pl. lxxxix, fig. 2).
1906. *Cryptopterus bicirrhys*, Popta, *Notes from the Leyden Mus.* XXVII, p. 26 (not of Cuvier and Valenciennes, 1839, p. 367) (type-locality, central Borneo).
1913. *Cryptopterus macrocephalus*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 217.
1937. *Kryptopterus macrocephalus*, Herre & Myers, *Bull. Raffl. Mus. Singapore*, No. 13, p. 67.

Range.—Sumatra, Borneo, Malay Peninsula (Perak, Johore) and Siam.

Specimens examined.—

- Bukit Merah, Parak State, British Malaya, one example. 31071.
- Kota Tinggi, Johore State, British Malaya, three examples. 33863.
- Near Kulai, Johore State, British Malaya, ten examples. 39334.
- Singora, Siam, one example. 14840.

Kryptopterus micronema (Bleeker).

- 1846a. *Silurus micronemus*, Bleeker, *Nat. Gen. Arch. Ned. Ind.* III, p. 280 (type-locality, Batavia).
- 1851c. *Silurus phalacronotus*, Bleeker, *Nat. Tijds. Ned. Ind.* II, p. 429 (type-locality, Borneo).
1858. *Phalacronotus micruropterus*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 307 (type-locality, Palembang, Sumatra).
1858. *Micronema typus*, Bleeker, *ibid.*, I, p. 300 (type-locality, Batavia, Java).
1859. *Micronema phalacronotus*, Bleeker, *Enumeratio specierum piscium in Archipel. Ind. observatarum*, p. 139.
- 1862a. *Micronema typis*, Bleeker, *Atl. Ichthyol.* II, p. 91, pl. lxxlii, fig. 2.
1902. *Cryptopterus micronema*; Vaillant, *Notes from the Leyden Mus.* XXIV, p. 48.
1905. *Micronema phalacronotus*; Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, p. 469.
1913. *Cryptopterus micronema*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 221.
1934. *Kryptopterus micronema*, Fowler, *Proc. Acad. Nat. Sci. Philadelphia*, LXXXVI, p. 87.
1937. *Kryptopterus deignani*, Fowler, *ibid.*, LXXXVI, p. 136, figs. 10-12 (type-locality, Me Poon, Siam).
1945. *Kryptopterus micronema*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 343.

Range.—Java, Borneo, Siam, and Malay Peninsula (Johore, Singapore).

Kryptopterus mononema (Bleeker).

1847. *Silurus mononema*, Bleeker, *Verh. Batav. Genootsch* XXI, p. 8 (type-locality, Java).
1858. *Kryptopterus mononema*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 287.
- 1862a. *Kryptopterus mononema*, Bleeker, *Atl. Ichthyol.* II, p. 87, pl. lxxli, fig. 1.
1864. *Cryptopterus mononema*, Günther, *Cat. Fish. Brit. Mus.* V, p. 39.
1913. *Cryptopterus mononema*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 220.

Range.—Java and Sumatra.

Kryptopterus moorei Smith.

1945. *Kryptopterus moorei*, Smith, *U. S. Nat. Mus. Bull.* No. 188, p. 342, fig. 78 (type-locality, Menam Chao Phya, Siam).

Range.—Siam.

Kryptopterus schilbeides (Bleeker).

1858. *Hemisilurus schilbeides*, Bleeker, *Ichthyol. Archipel. Ind.* I, p. 297 (type-locality, Sumatra and Borneo).
 1862a. *Hemisilurus schilbeides*, Bleeker, *Atl. Ichthyol.* II, p. 94, pl. lxl, fig. 4.
 1864. *Cryptopterus schilbeides*, Günther, *Cat. Fish. Brit. Mus.* V, p. 41.
 1913. *Cryptopterus schilbeides*, Weber & Beaufort, *Fish. Indo-Austral. Archipel.* II, p. 216.

Range.—Sumatra and Borneo.

Kryptopterus sp.

Specimens examined.—Muar, Johore State, British Malaya, one example. 31072.

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 ——— 1846 (3).—Oversight der Siluroïeden, welke te Batavia voorkomen. *Ibid.* III, pp. 135-184.
 ——— 1846a (4).—Silurodidenorum Bataviensium species nuperrime detectae. *Ibid.* III, pp. 284-293.
 ——— 1847 (7).—Nieuwe bijdrage tot de kennis der Siluroïden van Java. *Verh. Batav. Genootsch.* XXI, pp. 1-12. (Not seen.)
 ——— 1851 (35).—Nieuwe bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Nat. Tijds. Ned.-Ind.* I, pp. 259-275.

* Numbers in parentheses refer to Bleeker's papers, as listed by Weber and Beaufort in their index to Bleeker's Works (Fishes of the Indo-Australian Archipelago, vol. 1).

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- 1851b (45).—Vierde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Ibid.* II, pp. 193-208.
- 1851c (49).—Vijfde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Ibid.* II, pp. 415-442.
- 1852 (67).—Diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. Tiental I-IV. *Ibid.* III, pp. 569-608.
- 1853 (82).—Nalezingen op de ichthyologische fauna van het eiland Banka. *Ibid.* V, 175-194.
- 1853a (86).—Nieuwe tientallen diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. *Ibid.* V, pp. 495-534.
- 1853b (91).—Nalezingen op de ichthyologische fauna van Bengalen en Hindostan. *Verh. Batav. Genootsch* XXV, pp. 1-164.
- 1855 (139).—Negende bijdrage tot de kennis der ichthyologische fauna van Borneo. Zoetwatervisschen van Pontianak en Bandjermasin. *Nat. Tijds. Ned.-Ind.* IX, pp. 415-430.
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- 1859 (233).—*Enumeratio specierum piscium hucusque in Archipelago Indico obrervatarum.* Batavia, pp. i-xxxvi, 1-171.
- 1862 (299).—Notice sur les genres *Parasilurus*, *Eutropiichthys*, *Pseudeutropius* et *Pseudopangasius*. *Versl. Akda. Amsterdam* XIV, pp. 390-399.
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